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Toward A Philosophy Of Systems And Procedures Management

Arthur E. Carlson

▶ The rapid growth of high-speed machinery for processing business data has given impetus to systems and procedures improvement and out of this development, a genuine philosophy of systems and procedures management appears to be emerging. Some of the components of this philosophy are as follows:

1. A good system should provide management with better information at reduced costs.
2. A good system should provide management with information useful for making decisions.
3. Some preliminary study of an existing system usually is necessary to come to grips with the major problems that require solution.
4. The systems analyst must be aware of the economic realities of the shift in the capital-labor ratio.
5. The systems analyst must have a working knowledge of costs and cost analysis techniques.

Any business manager might ask: "Why should the systems and methods of our business be analyzed for potential improvements?" He should be told that an information processing system which was adequate a few years ago may be inadequate today and unsuitable tomorrow, because technicians are constantly at work on faster, more efficient, more reliable business machines and equipment.

The two primary objectives of systems and procedures studies seem to be to reduce cost and to provide management with better information. Cost reduction can be accomplished through reduction in processing costs and measured in terms of dollars, man hours, or machine hours. It can also be accomplished through a built-in expansion factor in a given system which does not require proportionate increases in working capital and operating personnel.

The quality of information available to operating management may be improved through screening unimportant from important results, obtaining greater accuracy of results, reporting results more rapidly, and in obtaining, as a by product, new kinds of

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closely related business information. An indication of improvement is when a better quality of information is obtained after a systems and methods change.

Information for Decision Making

Better information for management is an important objective of any systems and methods improvement. However, it is equally important that management be able to use such improved information in making sound business decisions. In many instances, this will require either new training or retraining in terms of recent concepts and techniques.

Day-to-day operations must be responsive to management decisions. If operations are responsive but information is scanty and inaccurate, information improvements should produce dramatic benefits. However, if operations and changes are hemmed in by a myriad of restrictions, careful decisions based on better information probably will have negligible effects, and detailed systems analysis will have doubtful value.

Scope of Analysis

Any business manager might also ask: "How much systems and methods analysis is necessary in my business?" The prospects of improving his situation bear directly on the amount of *worthwhile* analysis that can be implemented although some analysis is necessary merely to get a clear picture of the "lay of the land."

A systems and methods analysis may be either narrow or broad. Some studies grow out of dissatisfaction with existing methods in isolated phases of a business or industry. A narrow analysis usually will come to grips with a particular problem. If, however, the over-all relationships of interrelated areas are to be explored, a broad analysis is indicated. For example, problems of inventory control are closely related to problems of purchasing, accounts payable control, production control, and financing. A broad analysis often avoids duplication of effort in the implementation of new systems and procedures in closely related areas. A sound philosophy of systems and methods management encourages the over-all view and long-term solutions.

Progressive Appraisal

As a systems and methods study progresses, the analyst should ask himself from time to time whether further analysis is worthwhile. A preliminary investigation is desirable. In an exploration, many of the areas investigated prove to be "dead ends," whereas other areas which need attention may be overlooked. A depth analysis should therefore be undertaken if the preliminary investigation shows genuine opportunities for improvement.

The cost of a systems and methods analysis, either preliminary or in depth, should be compared with improvement potentials which appear to be attainable. A period of time should be estimated for a study and a certain number of people (or man-days) specified if the total cost is to be controlled.

Determining Time

A business manager may well ask: "How much time should be allowed for a systems and methods study in my company?"

If a preliminary investigation appears to warrant further analysis because tangible improvements are in prospect, the following questions should be asked with respect to systems and equipment:

Systems

1. What is the priority of prospective applications for analysis?
2. How much analysis is suitable of the present and of the proposed systems?
3. What improvements in information are desirable?
4. What improvements in over-all operations are possible?
5. What cost reductions in systems and methods are feasible?
6. What effect will the proposed new system have on personnel in terms of disruption, retraining, and adjustment?

Equipment

1. How much investigation is required to understand both selection and application problems with respect to equipment?

2. Will small, medium, or large-scale equipment be the most suitable?
3. Should equipment be general- or special-purpose in nature?
4. What will be the cost of obtaining, installing, applying, and operating the equipment chosen?
5. Will any specific advantages result from installing the newest equipment available?

Structure versus Technique

A comprehensive study of a business data processing system must regard a system as a combination of structure and technique. The structure of a system depends upon the decision-making organization of a business, the paper flow plan, the frequency and delay in preparing reports, the method of handling exceptions, and the degree of centralization of data-processing work. The technique of a system depends upon the processing equipment used, the methods of training machine operators, and the number and arrangement of record files.

Technical changes tend to be made more rapidly than structural changes because techniques are generally easier to change, and because management usually is reluctant to disturb existing business structure. Business management may be anxious to obtain new equipment merely to keep up with its competition, whether or not the acquisition can be justified on a cost basis.

Revolutionary developments in the techniques of processing data have led much of modern business management to make rapid technical changes, accompanied by gradual structural changes. Structural changes have been gradual on the whole because of the relative unwillingness to change of most business organizations. However, structural changes which are neither planned nor wanted may be forced on business managers because of these revolutionary developments. There is little question that current developments in data processing are pushing management to greater degrees of centralization.

Shift in Capital-Labor Ratio

An interesting phenomenon of the past half-century in business is the pronounced shift in the ratio of capital to labor. At the turn of the century, the ratio of equipment to operating personnel was quite small. Equipment consisted of a high desk, high stool, green eyeshade, black arm bands, paper, a common pen, and a waste receptacle. In less than sixty years, the ratio of capital to labor has increased so much that many thousands of dollars may now be invested in equipment for the use of each data-processing employee. What are the implications of this shift?

A New System

What factors determine the design of a proposed system? The most important factors are the goals of the work to be completed, and the data needs of the group. Next is the part played by the existing system. A new system is often seriously restricted by an existing system. Finally, current technical developments severely limit the selection of equipment. In a particular installation, available machinery may contain unnecessary or undesirable features, while needed features are not available. The high cost of major individual design changes makes them largely impossible.

The justification of any proposed systems and procedures improvement involves demonstrating that the benefits of the results will be greater than the cost of obtaining them. There are two pure approaches to this economic analysis: One is a demonstration of outright reductions in personnel, equipment, and practices; the other is a demonstration of increased revenue because of the proposed improvement.

Combinations of these two pure approaches are:

1. cost increases in acquisition and utilization of new equipment, offset by greater proportional increases in revenue resulting from the improvements, and
2. simultaneous increases in revenue and decreases in cost of systems operation.

It is often difficult for the systems and methods analyst to evaluate the content of reports and schedules, since their value can be measured only indirectly through the operating improvements which they foster. What is more, the analyst cannot predict how

operating personnel will react to new systems. A data processing system cannot function efficiently if there is resistance from operating personnel.

Systems Cost Analysis

Obviously, a systems and procedures study should try to establish that system and related equipment which will produce the greatest value over cost. To accomplish this, the analyst should have a good working knowledge of fixed, variable, average, marginal, historical, replacement, capital, and opportunity costs.

The rental cost of machinery and equipment (or imputed rental to the owner) and many organization costs are fixed, whereas the number of pieces of paper work (or punched cards) processed per time period is ordinarily variable. Overhead cost of a given installation is an example of average cost but it must be related to a specified volume of activity. If an analyst is concerned with a change in cost associated with a change (either up or down) in the volume of a data processing activity, marginal cost is more appropriately used. The marginal principle may also be applied to estimated changes in the value of information.

The accounting departments of most businesses use historical costs as a basis for determining depreciation and book values. However, purchase or replacement decisions with respect to data processing equipment deal with the future so they should also be concerned with costs of replacement.

Capital costs are the costs of ownership or use of equipment. If data processing equipment is rented, capital costs include the rental, plus any interest paid on borrowed money used either for rental or upkeep of the equipment. If the equipment is owned, capital costs include interest on money borrowed to make the initial purchase, as well as the "cost" associated with risk of loss on the equipment through deterioration, obsolescence, or reduced demand for the services which the equipment will provide. Opportunity cost is involved in either purchase or rental of data processing equipment to the extent that other income-producing investment opportunities are foregone.

The business manager has a choice between buying new data processing equipment outright, renting the equipment, or engaging in some sort of hire-purchase plan with the manufacturer. Purchasing the equipment provides some hedge against inflation, and will prove the better choice if the equipment functions smoothly and can be kept busy most of the time. On the other hand, renting the equipment has the advantages of providing a known fixed cost for the period of the agreement, shifting the incidence of the cost of maintenance and parts to the owner, and protecting the lessee against future capital loss through use and ultimate disposition. A compromise of renting for a year or two with an option to buy the equipment thereafter is offered by some equipment manufacturers.

Recommendations

As a result of his study to determine the system which should produce the greatest excess of value over cost, the systems analyst will probably recommend one of the following alternative courses of action:

1. No changes should be made in either the system or the equipment.
2. The old system should be modified, but no new equipment is needed.
3. A new system should be installed, but the use of the existing equipment may be continued.
4. A new system should be installed, and new equipment should be obtained by rental, purchase, or a combination.

Of course, the general reaction of operating personnel will temper an analyst's choice of alternatives. Once a decision has been made, a sizable investment may be required before the new system is operative. A few of the "system organization costs" include: (1) the cost of the initial analysis; (2) the cost of training personnel in the functions of the new system; (3) the cost of developing new procedures and flow patterns for paper work; (4) the cost of installing new methods and equipment; and (5) the cost of conversion from the old to the new system. While some equipment items may be salvaged, many of the other costs are "sunk." For this reason, the net value of a new system is a negative figure in the early stages of operation, but shifts to a positive figure as information benefits begin to be realized.

It is difficult to forecast the future. The speed at which technological development will take place may turn out to be either slower or faster than predicted. In practice, a given system may work out differently from what was foreseen by the analyst. The load of work on the system may peak unexpectedly or bog down. Although the past operations of a company are the best guide that the analyst has to the future, much remains to be desired, because of changes in data, information needs, costs, tasks, and technology.

Conclusion

In summary, problems of business management, business systems, and equipment change continuously. Systems and procedures improvement is therefore a continuous process. Many enterprises are recognizing this today by employing permanent systems analysts on their staffs. The objectives of better management information and cost reduction can best be realized by one who is thoroughly familiar with the internal operations of a business.

In the early stages of a systems study, it is difficult to tell how much analysis is necessary. Some analysis usually is required merely to size up the situation.

The systems analyst plans his work by comparing the projected cost of a particular investigation with the potential improvements which management may enjoy as a result. His objective is to maximize the net difference between the monetary values of these two factors in any given situation. If big improvements are in prospect, a quick analysis is preferable. On the other hand, if improvements hold little prospect of being significant, a more pedestrian approach is in order.

A smoothly operating data processing system combines *structure* (operating personnel, flow of paper, reporting plan) and *technique* (processing equipment, the training of processors, and the filing system). Because of the rigidity of most existing structures, technique usually is changed more rapidly. Minor structural changes can be made on the strength of projected technical changes, but major structural changes are usually uneconomic without actual improvements in technique.

The pronounced shift in the capital-labor ratio over the past half-century has made and will continue to make personnel available for reassignment to other tasks. Flexibility in terms of personnel will be offset by rigidity in equipment, which must be accepted in order to gain speed and simplicity of operation.

The design of a proposed systems and methods installation is affected by the information and data needs of business tasks, the existing system, and the state of technological development. Cost is always a restrictive factor which imposes a ceiling on any proposed systems and procedures improvement.

The goal of the systems analyst is to choose the system and necessary auxiliary equipment which will produce the greatest excess of information value over cost in terms of its operation. To accomplish this objective, the analyst must be conversant with all of the currently accepted categories of cost which bear on such an analysis.

The business manager contemplating a systems and procedures improvement must choose between outright purchase of equipment, lease of equipment, or a combination lease-purchase plan. The primary alternatives which govern the choice between purchase and lease are the desirability of a hedge against inflation versus shifting the incidence of financing and maintenance to the owner.

As a result of his deliberations, the systems analyst will recommend either no change whatsoever, no new equipment but modification or conversion of an existing system, or new equipment accompanied by a new system. The choice which the business manager makes from among these alternatives will depend largely upon the size of his budget for the investigation and his sincere desire to receive greater benefits from his system.

Systems and procedures management is one of the most dynamic areas in business administration today. It presents a challenge to future business managers and future systems analysts. The ideas in this article have been presented toward the development of a genuine philosophy of systems and procedures management. **s/p/a**

A New Look

George W. Brooke, Jr.

▶ The systems analyst has a good tool in data processing equipment for obtaining cost reductions in business operations. But is this tool becoming the master instead of the servant? Is the analyst turning into an artisan, making applications of punched card and magnetic tape equipment? Is his field of interest and contribution becoming narrower? Has the analyst spent so much time applying the new equipment to the usual "office" routine and the established office reports that he's out of touch with what is happening in the rest of the organization?

What are the real facets of a company's operation? Have you taken time lately to consider such problems as inventory control, production planning, budgeting, sales forecasting, warehousing, and a host of others? Perhaps it would be wise to hold off the automation gimmick for a while and take a look at the other problem areas.

The systems and procedures function in many companies is a part of the accounting department, and this arrangement may result in limiting the systems activity to accounting and general "office" problems. In order to re-orient the work of the systems analyst, it is necessary that he break away from this strict identification and point of view.

A New Look. The three major functions within a firm are accounting, manufacturing, and sales. The accounting area has been fairly well explored by the systems analyst; the next area, manufacturing, should be a natural for him. There he will find a need for better inventory control procedures, production scheduling, allocation of machine time, and the planning of direct labor requirements. And, when we speak of inventory control, let us not immediately envision a perpetual inventory system on electronic data processing machines.

Training. The systems analyst can apply some of the techniques of Operations Research or Scientific Management to help determine and maintain optimum levels of inventory.[1] He can use linear programming techniques to schedule machines and plan production. But here a difficulty usually arises; since the systems analyst has been oriented toward general "office" problems, the profession has tended to attract persons trained in general business, accounting, and the social sciences. The gap between the accounting or business background and Scientific Management methods can be closed only if the systems and procedures analyst is willing to study published papers, technical reports, and college extension courses.

1. John F. Magee, "Guides to Inventory Policy," *Harvard Business Review;* January-February, 1956; March-April, 1956; May-June, 1956.

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Some Manufacturing Problems

Manufacturing problems are diverse and can well benefit from the practical approach of the systems analyst. A problem which receives considerable attention is that of maintaining proper inventory levels. The systems analyst has, in some instances, been brought into contact with this problem and has used his skills to help in the design of inventory control systems and procedures.

Inventory Control. In designing a complete yet simple inventory control system, suppose the following is to be accomplished:

1. Divide the inventory into categories, dependent upon the annual dollar usage.

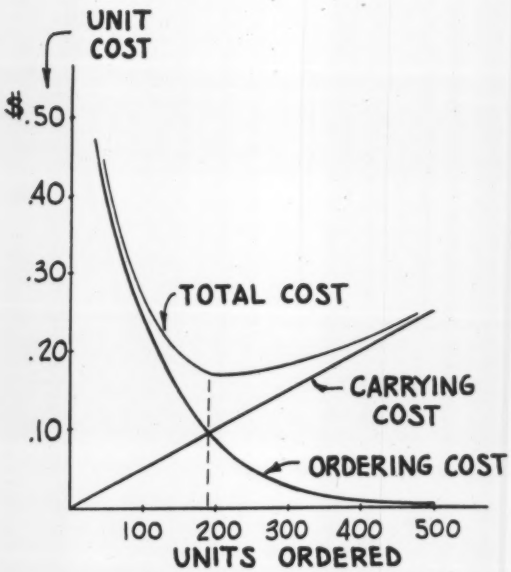
The type of system to be requested is basically a *management decision* and should not be pre-empted by the systems analyst. His responsibility is to present the entire picture to management in a clear manner and explain the choices available so that a good decision can be made. Once the decision is made, it is up to the analyst to determine the best controls which will reflect the value of the items being controlled (low value, few records, and little posting; high value, strict control, and more detailed records).

It is necessary to fit a system to a company, but generally it is possible to reduce the quantity of records and files kept in the inventory control department. If a company has widespread or diverse plants, it may be desirable to use a perpetual, up-to-the-minute control of all items, possibly through electronic data processing equipment, particularly if *decisions* are to be made as a result of changes in inventory. The next two objectives then would be:

2. Determine economic order quantities and re-order points. (see Figures 1a and b)

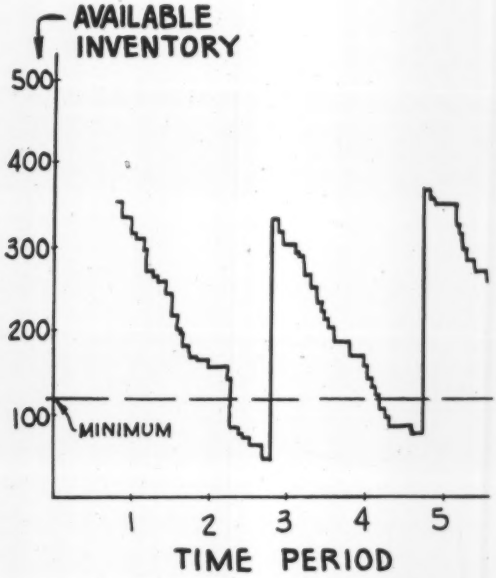
3. Design the procedures for automatic control of high annual-usage-value parts and materials. (See Figure 2.)

A number of departments (manufacturing, sales, purchasing) are involved in the control of inventory. In this example, let us



LOW ANNUAL-USAGE-VALUE: ORDER "ECONOMIC QUANTITY"

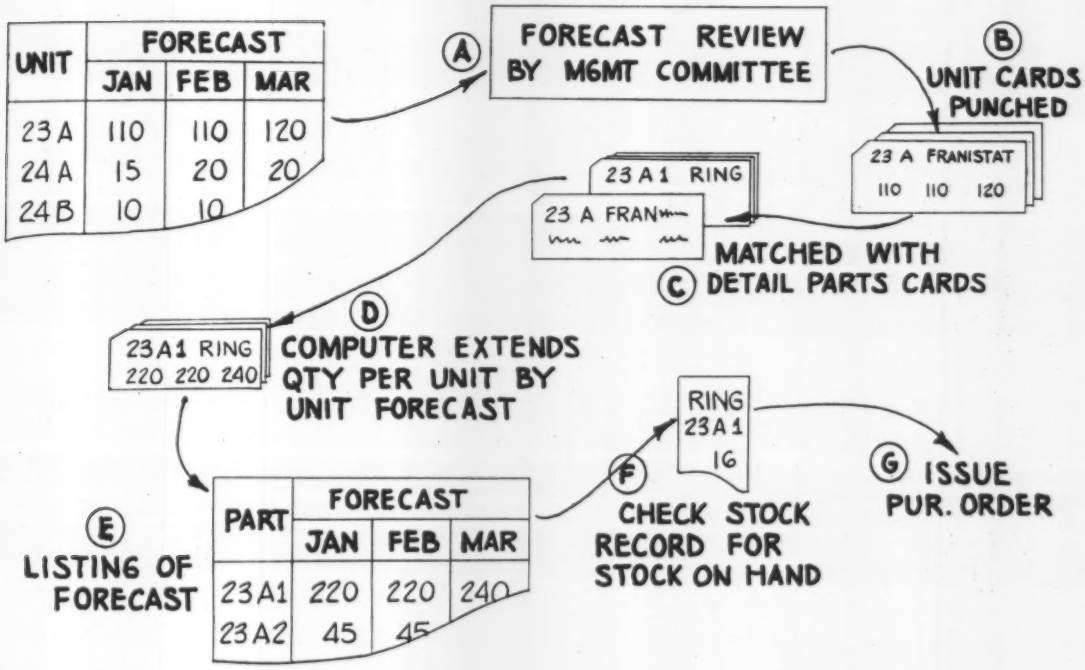
FIG. 1-a



AN ORDER IS PLACED WHEN INVENTORY IS AT "MINIMUM"

FIG. 1-b

FIG. 2



assume that electronic data processing equipment has been used to obtain up-to-the-minute control of the important part of the inventory (that part requiring large dollar investment). It is now possible for purchasing to issue purchase orders or releases against blanket orders and for production control to issue shop orders according to forecasts.

Production Scheduling. The production control department schedules shop production and loads machine centers to meet forecast requirements; this procedure leads to problems of production planning of parts and units, some of which require similar tool set-ups. Operations Research personnel have helped develop techniques here which can be used by the systems and procedures analyst. For example, automatic screw machines are used to perform operations on complex parts, but the set-up time may prohibit their use for short runs. It would be foolish (though sometimes necessary) to spend ten hours of set-up time to prepare for a half-hour production run. Hence, it is desirable, when possible, to schedule parts requiring similar operations and tools consecutively. Linear programming helps to determine when such "bunching" of parts is practical. And here one is reminded that it may be better to use approximate methods rather than to try to obtain *exact* solutions to such scheduling problems.[2]

A Unified Sales Effort

To control inventory, the activities of the sales and manufacturing departments must be coordinated to a great degree. A sales forecast is one tool which will tie these two departments together, promoting smoother production and quicker filling of customers' orders.

Sales Forecasting. Problems of forecasting should be considered by the systems analyst. In helping to develop a forecast, the analyst must ask questions, such as: What is the basis for the forecast? What method of forecasting should be used? How reliable are the figures on backlog shipments as a basis for the forecast?

2. N. V. Reinfeld and B. L. Hansen, "How You Can Use Linear Programming," *Mill and Factory,* December, 1957.

In the sales forecast procedure, partially outlined in Figure 3, the product managers, marketing manager, and management committee are in control but some of the clerical work can be done with punched card equipment. The equipment might be used more extensively than it usually is, but it is desirable to use as simple and straightforward a procedure as possible and yet obtain a forecast which is accurate and can be used as a basis for *decisions*.

FIG. 3 - FORECAST

1. ON THE 10TH WORKING DAY OF EACH MONTH THE TAB DEPARTMENT WILL PROVIDE THE MKTG ADMINISTRATION MGR WITH A TAB RUN OF UNITS SHIPPED IN THE PREVIOUS MONTH.
2. THE SHIPMENT FIGURES WILL BE POSTED TO FORECAST WORK SHEETS. THE BACKLOG FIGURES WILL BE POSTED TO THE WORK SHEETS. THE WORK SHEETS WILL BE GIVEN TO THE PRODUCT MANAGER (S) BY THE 12TH WORKING DAY OF EACH MONTH.
3. BY THE 14TH WORKING DAY THE PRODUCT MANAGER (S) WILL MAKE SALES FORECAST WHICH WILL BE POSTED TO THE WORK SHEETS. THE FORECAST WILL CONSIST OF INDIVIDUAL FIGURES FOR EACH OF THE FOLLOWING THREE MONTHS.
4. ON THE 14TH WORKING DAY THE WORK SHEETS WILL BE SUBMITTED TO THE TAB DEPARTMENT. THE FORECAST FIGURES WILL BE PUNCHED IN MASTER TAB CARDS AND THE UNIVAC WILL P THE FIGURES LISTIN

TO THE 16TH EACH MONTH, THE SUBMITTED TO A FORECAST ITEE, CONSISTING OF THE PRESIDENT, CONTROLLER, SALES MANAGER AND MANAGER OF MANUFACTURING. THIS COMMITTEE WILL REVIEW THE FORECAST, MAKE CHANGES DEEMED NECESSARY AND RETURN THE LISTING TO THE TAB DEPARTMENT. A REVISED LISTING WILL ~ ETC. ~

Warehousing Problems. Many problems attend the warehousing of finished goods and replacement parts. A systems analyst can help solve some of these. One question which immediately arises is, "How much inventory should be carried in warehouses?"

Sales people would like to have a warehouse stuffed to the rafters with inventory so that no customer would have to be turned away or kept waiting. The accounting and finance people, on the other hand, would like to maintain as little inventory as possible though they are well aware of the need for good service to the customer. Manufacturing is not so concerned about the level of inventory as about the headaches associated with small production runs which may result when a local warehouse manager wants to carry a sample of every product variety.

The inventory to be carried must be established to give dependable service to the customer, yet not tie up great amounts of money. One effect of warehouse inventory is to

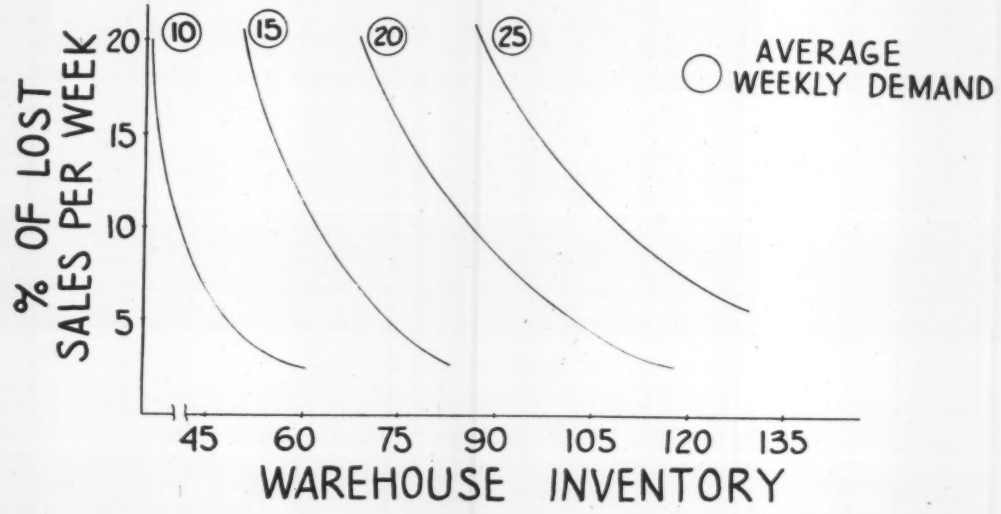


FIG. 4

cushion sales fluctuations so that the factory does not vacillate to such an extent between high and low levels of production;[3] that is, unless the inventory is slow moving "dog" items. The problem, then, becomes one of balancing possible lost sales against inventory investment. The graph in Figure 4 is adopted from an article dealing with this problem.[4]

Here again the systems analyst can enlist the aid of quality control and statistical personnel to good advantage. He can, of course, also attempt to adapt statistical techniques without help.

Once inventory levels have been established at each warehouse for each active variety of product, it is necessary to develop the procedures to be followed in maintaining the inventory. An automatic method of replenishing *one* for *one* might be used; that is, a copy of the warehouse sales order is sent to the factory and the factory sends the warehouse exactly what is listed on the sales order. However, to maintain steady factory employment, this plan would necessitate steady sales and many products are seasonal. Therefore, inventory must coordinate with seasonal fluctuations. Perhaps two inventory levels can be established, one for summer and one for winter (or whatever the seasonal periods are). In addition, it is necessary to establish review procedures so that the growth and deterioration of product sales patterns can be considered. The systems analyst has a definite role to play in the establishment and maintenance of the warehouse inventory levels.

The General Office

Some of the problems of manufacturing and sales have been briefly discussed but there are many other problems in these areas which could use the services of the systems analyst. Rather than devote the entire article to these two areas, it seems appropriate also to discuss a few of the problems of the general office, the Accounting Department, and the Engineering Department.

Cost reduction can be achieved in most offices through forms revisions, better and fewer files, simplification of communication patterns, and the elimination of unnecessary clerical effort. There has been some resistance to the use of statistical techniques for controlling office performance. This difficulty has tended to defer applications of these techniques, but the resistance in the office (and on the part of management) should give way to confidence once an application involving statistical techniques has been made. Such applications will find greater popularity in the general office as systems analysts become more versatile and proficient in the use of this "tool."

As an example of one type of application, let us review a task common to most offices —checking. To attempt a 100 per cent check of a clerical operation is equivalent to having two persons doing exactly the same job. One person performs the task; a second person repeats the same task—to "check."

One way to handle this problem is to determine the past level of errors for the operation, what constitutes an error, what level of errors is permissible (perfection is generally impossible), and the cost of the 100 per cent check. Then, set up a quality control procedure for checking. The Quality Control Department may help, but the systems analyst should be prepared to work out the solution alone. He should compare the cost of the complete check with the cost of a partial check or sampling. Remember, a sound statistical sample of work performed allows an accurate estimate of the level of performance. The cost of errors should be included in the cost of the partial check.

The sample size depends on the level of accuracy required and the frequency and magnitude of past errors. Also, it may be desirable to design several sampling plans, to be followed at different points; thus, different elements of the same over-all operation can be controlled independently. For example, to determine a sampling plan to control the processing of sales orders, each operation that is performed should be examined. The operations might be:

A. Identifying the customer order.
B. Typing out a sales order form.
C. Pricing each item on the order.

3. Jay W. Forrester, "Industrial Dynamics, A Major Breakthrough for Decision Makers," *Harvard Business Review*, July-August, 1958.

4. Kalman Joseph Cohen, "Determining the Best Possible Inventory Levels," *Industrial Quality Control*, October 1958.

D. Posting the amounts shipped, if shipment is made.

E. Extending the unit price by the quantity shipped.

Errors must be classified and rated; a mistake which is permissible should not be considered an error. In the above example, mistakes might be:

A. Mistake in identification which could result in manufacture of a wrong product.

B. Mistake in typing of constant information such as "ship-to" address, terms, product class, or invoicing instructions. The results here will vary in accordance with the mistake made.

C. Mistake in pricing which results in loss of income and/or loss of customer's confidence.

D. Mistake in quantity shipped which results in loss of income and/or loss of customer's confidence.

In one sales order processing system, where the aid of the quality control section was solicited to determine the type of sampling plan necessary to control errors in pricing and in posting quantities shipped, it was found that pricing errors had been made at the rate of 3.2 per cent even though a 100 per cent check of sales orders was performed by a full-time checker. Approximately 100 sales orders were processed each day with an average of two lines per day. A daily sampling plan was developed as follows:

". . . sales orders, after typing and pricing, will be subjected to a sampling inspection.

(1) The checker will use a table of random numbers to select thirty sales orders.

(2) The pricing and typed information will be checked thoroughly, and all errors will be corrected.

(3) If three or more sales orders are found to contain *pricing* errors, the output for the day will be given a 100 per cent check. All errors found will be corrected."

This plan was based on an operating characteristics curve which was constructed for a sample of 60 items of a total of 200. The reader will find various texts available which will explain the construction and use of the O.C. curve.[5] Since Figure 5 shows the curve, a word of explanation here may be desirable. The curve should be read as follows: If the day's sales orders were to have 7 per cent of the items priced incorrectly, there is a 20 per cent chance that the day's work will be passed without rejection and 100 per cent inspection. If the past level of errors continues, the sales orders for about two days each week are inspected 100 per cent. If improvement in accuracy is expected, the checker should plot the number of errors found each day on some sort of continuing chart or log.

What about the quality level of outgoing sales orders? Suppose a curve of outgoing quality is drawn as in Figure 6. The average outgoing quality level (AOQL) illustrated is approximately 1.5 per cent. If the work improves over a period of time, as it should if the personnel is made conscious of the reasons for inspection, the outgoing quality level will improve greatly.

In passing let us consider one other type of sampling plan which may be used to control the quality of clerical tasks. This is acceptance sampling and the plan is designed to reflect the accuracy of the work being performed. A complete plan consists of a quality level which is acceptable, a method for drawing the sample, and a sample size. If the sample does not stay within the quality limit, the lot from which the sample was taken is subjected to a 100 per cent check and all errors discovered are corrected. The lot is then passed, and a sample is drawn from the next lot received, etc. It must be stated again that it is not always possible, or desirable, to use sampling as a *control* technique, if errors are frequent and cannot be decreased in number. It may be advisable in such an instance to have a 100 per cent check of all work. If, as is true of many clerical tasks, the quality can be improved through diligence, it is desirable to examine the possibility of using statistical sampling techniques.

5. Acheson J. Duncan, "Quality Control and Industrial Statistics," Irwin Press, 1955.

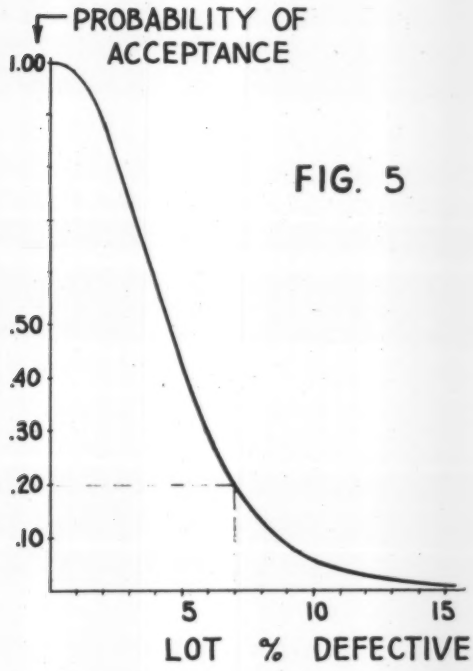


FIG. 5

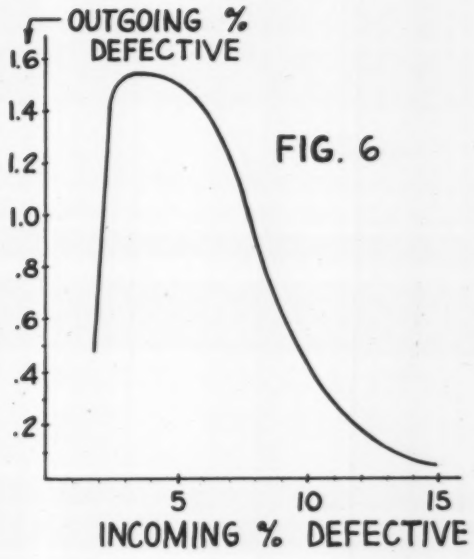


FIG. 6

Accounting

The use of statistical techniques in the office is not limited to the control of quality. For example, one accounting application which may find greater acceptance in the future is the aging of accounts receivable. Though the aging of receivables does not serve to find delinquent accounts (the credit manager should already have these singled out), aging does help the company to determine the liquidity of its receivables. This information will help management *make decisions* regarding cash, inventory investment, and so forth. There are at least three methods of aging receivables:

A. An "open file" of receivables may be kept by the accounting department. This file consists of copies of invoices sent to the customers. When an invoice is paid, the copy is pulled from the open file and discarded or filed. At the end of the operating period a manual aging of the remaining invoices is performed.

B. A copy of the invoice may be sent to the tabulating department and cards or tape punched for the "line" items. As the customer pays, the appropriate cards are pulled from "receivables" and discarded. At the end of the period the remaining cards are sorted by date and listed, taking totals by date.

C. The third possibility is to use the "open file" as in *A*. However, a complete manual count is not made at the end of the period. Instead, a sample of the invoices in the "open file" is selected for aging.[6]

Each of the above three methods of aging receivables has advantages and disadvantages. If cost is the most important consideration, method *C* may be the best choice. If, on the other hand, high accuracy is desired, it may be necessary to use either method *A* or *B*. Even the 100 per cent aging is subject to question, of course; it may be necessary to design a sampling plan to check the validity of the 100 per cent aging.

Engineering

The engineering department offers many problems which will attract the interest of the systems and procedures analyst. Engineering files are important and, as a result of careful protection, are likely to become quite complex. Such files may include tracings, prints, customers' drawings, production routing sheets, material specification sheets, and master bill of material sheets.

6. Robert M. Trueblood and Richard M. Cyert, "Sampling Techniques in Accounting," Prentice-Hall 1957.

Clerical Effort. Duplicate files are found in many engineering departments and these additional files won't diminish, once started. The systems analyst must examine the files and pinpoint the reasons for having each. If the reason is protection only, it may be possible to combine files, change storage methods for the primary files, and obtain adequate protection with fewer files and, therefore, fewer people taking out pieces of paper, putting them away, and bringing them up to date.

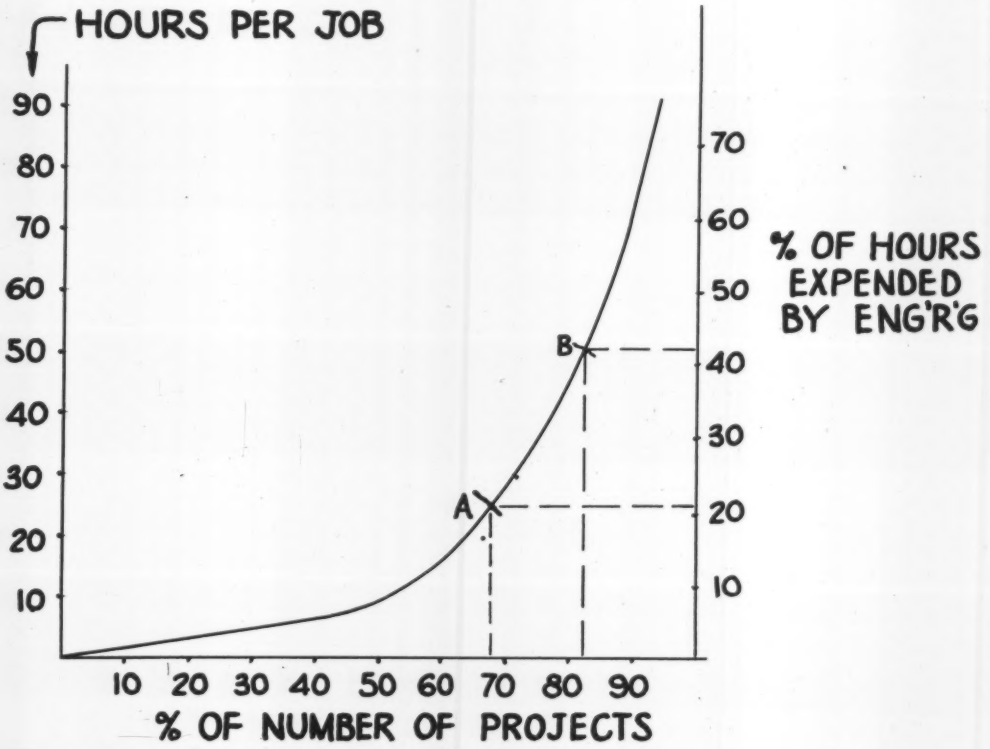
Better Use of Time. Another problem is the control of engineering time, particularly time devoted to product design, product development, laboratory and model shop research, and product revision. This control must be extended to the projects themselves: authorizing, planning, and carrying out and following up the projects once they are begun. In Figure 7, the projects over a period of time were checked to determine the time spent in carrying out each one. The curve was then constructed and a *management decision* made as to where it should be divided. The curve was broken at point *A* and all projects requiring twenty-five hours or less were to be authorized by the project engineer and/or the product manager. Note that about 68 per cent of all projects required twenty-five or fewer hours, and these comprised only 21 per cent of all hours expended on engineering projects. Thus the project engineer was allowed to authorize many small projects which did not represent a great portion of the total working time spent. The standard procedure might be written as follows:

". . . The responsibility for authorizing an engineering project will rest with —

(a) the project engineer and/or product manager if the estimate of required time is twenty-five hours or less.

(b) the manager of engineering and the market planning manager if the esti-

FIG. 7



mated time required is between 25 and 50 hours.

(c) the managers of engineering, marketing, manufacturing, and finance, if the estimated time required is greater than 50 hours.

Once a project has been authorized, it will be released by issuing the engineering order . . ."

Note that the managers of engineering, marketing, manufacturing, and finance would (in this example) jointly authorize all projects estimated to require more than fifty hours of time. About 19 per cent of the projects require more than fifty hours as indicated by that portion of the curve which is to the right of point *B*. This 19 per cent represents about 58 per cent of all time spent on engineering projects. Thus, those few projects requiring greater expenditure of time are authorized by a high management level.

Greater Expectations

Generally, the systems and procedures analyst works on forms control, work simplification, and "office" problems, and strives for cost reduction through simplification. But, in addition, the analyst should offer his services in helping to solve other types of problems. He should be prepared to work on inventory control, production scheduling, and shop procedures; sales problems such as may be encountered in setting inventory levels for branch warehouses; and in setting up sales forecasting techniques and the associated procedures. He should weigh the value of statistical tools in these various problem areas. He should re-examine the uses of electronic data processing equipment from this broader point of view to determine whether better applications can be made to help management *make decisions* as well as to improve the performance of clerical tasks which, if examined carefully, might prove to be unnecessary.

In this *new look,* the systems and procedures specialist will find that he must make use of the new management "sciences" as well as accounting and general business analysis. As he does these things, the systems analyst will gain stature in the firm.

s/p/a

Worth Reading

"Sharpen Management With Data Processing", Emerson W. Mitchell, *Management Methods,* November, 1959.

General discussion of various aspects of punched card applications in a manufacturing company with equipment renting for $2200 monthly. Punched cards tell management what the factory backlog is, what factory costs are, and what order trends are. They tell production people when to manufacture to meet delivery dates and pinpoint orders behind schedule. Quality control is given details on scrap and rework. Other areas served are purchasing, sales, and accounting.

"Magnetic Ink: Common Language for Machines and Men", *Modern Office Procedures,* November, 1959.

Describes Bank of America's Electronic Recording Method of Accounting (ERMA). Each check or deposit slip is preprinted in magnetic ink, to show Federal Reserve routing, bank number, and depositor's number. At the time of a transaction, the bank's proofing machine prints, in magnetic ink, the amount and type of transaction. Customer accounts on tape are later posted by ERMA. Savings from ERMA will pay for the system in seven years.

"Why Automation," Charles E. Ginder, *Office Executive,* October, 1959.

Presents results of NOMA's survey of 369 companies with EDP or IDP. Use of punched cards alone is not included. Data are given for:

Cost of system by size of office
Survey response—type and size of office
Applications by type of business
Planned application by type of system

s/p/a

Publishers:

1. *Management Methods,* Management Magazines, Inc., 141 E. 44th St., New York 17.
2. *Modern Office Procedures,* Irving B. Hexter, 812 Huron Road, Cleveland, Ohio.
3. *Office Exeecutive,* Journal of the National Office Management Association, Willow Grove, Pa.

A Work Simplification Program

Maynard R. Watson

▶ Thomas A. Edison once said, "There's a way to do it better—find it." His advice has been followed by employees of the Pacific Gas and Electric Company ever since it was organized. Waste elimination programs, cost reduction programs, and an employee suggestion plan have all contributed to improving work methods and procedures in both the clerical and physical fields.

In 1954, our management established a department entitled Department on Procedures and Organization to conduct studies to improve work methods, procedures, and organization. Appreciable improvements have been made by this department through procedures studies. It is impossible, however, to cover all activities of a company of our size adequately, in a reasonable period of time, and with a limited staff, primarily because our operations extend over 94,000 square miles of northern and central California from Topock on the Colorado River to coastal Eureka, about 950 airline miles northwest. Also, we have more than 18,000 employees in a wide variety of activities. They include laborers, mechanics, fitters, carpenters, equipment operators, linemen, warehousemen, gardeners, cooks, meter readers, typists, accountants, engineers lawyers, buyers, statisticians, hydrographers, programmers, clerks of many classifications, and numerous others. Following Mr. Edison's philosophy that "There's a way to do it better," we believed that if we could train the Company's 3,000 supervisors in the use of proven tools and techniques of work simplification, greater improvements would result. A "feasibility" study which was made proved that the plan was practical and the proposal was presented to top management where it received support. We were then ready to start developing a program.

Maynard R. Watson, Senior Administrative Analyst, Pacific Gas and Electric Company, San Francisco, coordinates his company's work simplification program. He has been in methods and procedures work for the last fifteen of his thirty-four years with P. G. and E.

Plan of Action

Material on work simplification was accumulated for a training program for all our supervisors. The following plan of action was established:

1. Direct the training to first-line supervisors.
2. Make it general so that it will apply to all phases of operations: office, shop, and field.
3. Confine the training to the philosophy and basic elements of work simplification.
4. Limit the initial training to four 2-hour sessions.
5. Use guided conference techniques.

With these points of view, we proceeded to plan, organize, and write the training manual.

Avoid Misunderstandings

One of the very first things the program had to do was to allay any fears employees might have and avoid misunderstanding. Any program involving the work of employees is bound to create some apprehension, not only among those taking part but also among those who may be affected by it. So, the first part of the initial session is devoted to explaining and showing that the program is not going to cause a speed-up, it is not going to cause people to work harder, it is not a criticism of any person or of any procedure, and it is not going to cause regular employees to be laid off. Some of these later points are illustrated by the Pin Board and some

by example. It is pointed out that normal attrition will furnish ample opportunity to provide placement for any employee whose position may be eliminated through work simplification activities. Since this program is given to supervisors and not to employees below the supervisory level, supervisors are asked to stress this information with employees when they talk to them about improvement projects.

Be Open-Minded

The second thing the program must do is to develop an attitude of open-mindedness. For several reasons this is probably the most difficult aspect of the whole program. For instance, has anyone ever been heard to admit that he is anything but open-minded? On the other hand, how often have all of us been presented with a recommendation and found that our first reaction was, "It's impossible"? This is not an uncommon reaction because education, training, and experience have deeply impressed upon the mind that many things are impossible. Also, some things cannot be done because of rules, policies, or directives.

Tradition and habit make it difficult for one to realize in these changing times that what was impossible yesterday may be easy today; that yesterday's rule, policy, or directive should be revised to fit today's conditions. Several examples are used to emphasize these points and the idea of an open-minded attitude is kept before our people throughout the entire course. This plan of action has been quite effective. We are particularly pleased with the accomplishments in this area. The change in attitude is clearly evident in practically every section of the Company, and the supervisors are keeping their eyes open for the "better way," with less concern for tradition than in the past.

Learn by Doing

The remainder of our training program is similar to other such programs in the presentation of the tools and techniques of work simplification. We follow the principle of having our people learn by doing. They are shown how to select projects for study and each participant selects a pilot project from the activities of his own department or unit.

The second session is devoted to instruction and practice in breaking down a process and documenting it on the Work Simplification Analysis Chart. After the session on charting, the trainee is given an assignment of charting his pilot project before the next session. Then at the third session the trainee has an opportunity to read and discuss his chart with the group and clear up any problems encountered or questions he may have. This same pattern is followed through the analysis and improvement sessions. Sample charts are distributed and discussed to give a broader perspective and to furnish a guide.

Present the Proposal

In the final session, a method is outlined for preparing the proposal for presentation to the person who has authority to approve the change. There are also discussions on how to install improvements after approval is received and how to follow up to see that the improvements are working properly. Ideas are offered on how to "capture" savings because although frequently improvements result in a saving of only a few hours per week, month, or year, if that time is not captured and put to productive use, it is lost. (See the outline of the training program listing visual aids used and key points discussed in each session. Illustration I.)

Practice Safety

We are particularly conscious of the necessity of working in a safe manner because in a gas and electric utility many employees work around natural gas, electrically energized facilities, and various types of equipment in motion. Therefore, specific instructions are given not to eliminate any safety measure in any work method or procedure without getting the approval of the safety department. Furthermore, any change in any operation where safety is involved should be discussed with the safety supervisor before it is made.

Develop Teamwork

It is impossible to make an improvement without some kind of change, and it is natural for people to resist almost any change which is imposed by others. For this reason *the participative approach is recommended*

OUTLINE OF PROGRAM OF WORK SIMPLIFICATION IN P. G. AND E. OF CALIFORNIA

SESSION	TIME	SESSION TITLE	VISUAL AIDS USED	KEY POINTS DISCUSSED
1	2 hours	Introduction to Work Simplification	1. Flip Charts 2. Pin Board 3. Sound Film Strip introducing Work Simplification 4. Session Handouts	1. Develop through conference technique motivating factors and how they are satisfied through Work Simplification. 2. Management support. 3. Not criticism, speed-up, or working harder. 4. Pin Board demonstration. 5. Opportunities for improvement. 6. Benefits to supervisors and company. 7. Steps covered in film. 8. Open-minded approach. 9. Human relations. 10. Summary and assignment.
2	2 hours	How to Gather and Arrange Facts	1. Flip Charts 2. Sound film strip on gathering facts 3. Charting demonstration of setting gas meter or setting electric meter or typing letter. 4. Session Handouts	1. Review Session 1. 2. Participants tell project selected. 3. Pointers covered in film. 4. Charting demonstration. 5. Charts of demonstration. 6. Summary and assignment.
3	2 hours	How to analyze and improve methods and procedures	1. Flip Charts 2. Sound film strip on eliminating unnecessary operations 3. Sound film strip on combining, resequencing, etc. 4. Session Handouts	1. Review. 2. Participants read and discuss their charts. 3. Steps covered in films. 4. Sample charts. 5. Summary and assignment.
4	2 hours	How to Take Action and Follow Up	1. Flip Charts 2. Session Handouts **Illustration I**	1. Review. 2. Participants tell of their accomplishment in pilot project. 3. Safety. 4. How to capture savings. 5. Selling proposal. 6. Putting improvements into effect. 7. Recording results. 8. Work Simplification and the Suggestion Plan. 9. Summary and assignment.

in all work simplification activities. Supervisors are encouraged to consult and to bring in on a study all employees concerned or involved. This makes the employees part of the team. It gives them a chance to offer their ideas and suggestions. Recommendations for improvement through change come from the team. When employees are on the team which offers recommendations, they are interested in seeing the recommendations carried out. This approach takes a little more time, but it assures better results.

Inform Management

By the time the instructors' manual was completed, we wanted to acquaint middle management with the details of the program. Therefore, a Work Simplification Appreciation Program was developed. This program is a one-hour and fifteen-minute presentation designed to introduce the subject, show how it works, how the participants will benefit, and how the Company will benefit. The Appreciation Program was presented to the Company officers who wanted more information on the subject, and to about fifty general office department managers and assistants. This presentation provided management people with a clear picture of the program and solicited their support.

The managers of the thirteen geographic divisions were then invited to send people to the headquarters office for instructor training. The decision whether or not to use the program was left entirely to the division managers. No order was issued and no pressure was brought to bear. We wanted participation on a voluntary basis only.

Train Instructors

All the divisions sent representatives for instructor training. Twenty-three instructors were trained and provided with the necessary materials. It was recommended to the instructors that the four sessions of the program be spaced a minimum of one week apart and a maximum of one month. It was also recommended that the groups consist of twelve to twenty supervisors. Unusual circumstances in some areas made it impossible to comply with these recommendations, but observation and results to date have indicated that the program was most successful where they were followed. After receiving the training, some instructors scheduled their division training program for supervisors to start immediately and others undertook it as conditions would permit. To date, about 3,000 supervisors have received the training in about 120 different groups.

Replenish the Fuel

Through experience with a work simplification program we find that its continuity is somewhat analogous to that of a rocket missile. The momentum developed by the original fuel will carry it only so far. Unless there are additional stages of fuel ignition, the endeavor like the projectile, will fall or die out. For this reason, it is essential that a good follow-up be maintained. In our case, work simplification coordinators have been appointed in each of the geographic divisions. They handle the promotion of the program in their divisions, follow up with supervisors to see what improvements are being made, offer assistance when needed, assist in coordinating joint studies by several supervisors, distribute bulletins and other promotional media, and serve as liaison between the division and the general office.

The Department on Procedures and Organization directs the program and furnishes most publicity material. It will also provide yearly follow-up sessions to give the supervisors additional tools and techniques as they are ready for them. To stimulate ideas further, we are planning to produce motion pictures of work methods and procedures illustrating some *before* and *after* situations.

The first cost of the program is the biggest cost because of the concentrated effort necessary to get a program rolling. After the basic training is completed and the supervisors think habitually in terms of work simplification, the cost of the follow-up program is relatively small. Also, if a program is developed properly, the accomplishments should be progressively greater. We have just completed one full year in the program and the annual savings from improvements already amount to several times the initial cost. If the accomplishments to date are any indication of future achievements, we can say that the program has been a very profitable investment. **s/p/a**

Systems and Procedures —An Observation

Y. N. Chang

▶ In its organizational and functional perspective, Systems and Procedures, as a term, has an unsettled meaning. It is used by different companies to identify a group of activities ranging from work simplification and forms control to organization planning and management analysis. Organizationally its location varies from a unit in office management to a part of a controllership, or a staff assistantship to top management. It is true that no organizational unit, even when identical in name and assigned function to that in other companies, enjoys the same power and position. But if the task it performs is fundamental to a company and performance in it calls for skill requiring disciplined training, that organizational unit should possess an explicit and well-defined position. To be sure, *engineering* is always called *engineering* and there may only be a few locations for its placement in an organization. Other organizational units, lacking this clear-cut identification, may find themselves having a continuous struggle for management recognition and organization acceptance because of failure to assign them an explicit and well-defined position in the organization. Systems and Procedures work is seemingly faced with this problem. Thus, direct consideration of the problem is in order.

The Function Grows

Let us begin with a brief history of Systems and Procedures. It seems that Systems and Procedures was originally regarded as a function dealing with improving methods and curtailing waste in the manufacturing area. It was basically a problem of mechanics and cost, having apparently little relationship with the over-all management scheme. Its development, however, led to the establishment of Systems and Procedures to simplify *clerical* operations and to regulate accounting routine. Other activities became allied to Systems and Procedures as the outlook of management changed. Forms design, time and motion studies in clerical operations, space and facilities planning and control, office machine evaluation, records management, and other activities of a clerical, technical, and service nature were added to the Systems and Procedures function.

Through procedure writing, Systems and Procedures established control over clerical and accounting operations, thus exercising influence over operations throughout a company. Systems and Procedures was then looked upon not only as a means to improve administrative work of a clerical and mechanical nature and to regulate routine, but also as a control instrument—controlling performance and establishing work measurement. This latter task was regarded by management as akin to internal auditing. To summarize, Systems and Procedures work, during its initial development, was regarded as a work-simplifying, cost-saving, and control instrument in administration. Organizationally, it was placed in office management, administrative services, accounting, or internal auditing.

The Concept Changes

With the more recent changes in management concepts, a maturity in Systems and

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Procedures can be observed as it expands into organization planning, administrative systems, design, and management analysis. In government agencies, administrative analysis is considered to be a necessary function. Administrative analysis is the study of causes and solutions of administrative problems. It includes planning and improving administrative practices, methods, and organization structure. An administrative analyst is one who approaches these problems through practical scientific research techniques and creative thinking. He identifies the problem, determines the causes, and develops solutions. Administrative analysis is not confined to mechanics and cost; it is concerned with organization management, organization structure, control and planning, budget control, procedure writing, and statements of policies and programs.

In industry, Systems and Procedures practitioners find it difficult to separate the study of mechanics and cost from the analysis of organization. Indeed, the organization structure and its attributes are more basic and conducive to the effectiveness of an organization than mechanics and cost. The growing complexity of industrial organization, both in size and operation, and the rise of "managerial professionalism" further warrant the need for management analysis and instruction writing, the pronouncement of policy, and the design of major administrative systems to direct a complex operation. It is through this type of change in management concept and perhaps through a re-examination of the meaning of organization effectiveness that Systems and Procedures, though grossly inadequate at first to cope with this task, has become both closely associated with management and more mature. To summarize, it is now thought by Systems and Procedures writers and practitioners that Systems and Procedures has grown beyond the original boundary. It embraces organization planning, systems and procedure analysis, administrative systems design, and management analysis. Organizationally, it has become a staff function, reporting to a chief executive of an organization.

The Interpretations Differ

There is, however, a basic disagreement. It is one of definition. What is Systems and Procedures? Is it necessary to define it at all? There are those who believe that Systems and Procedures as a term is so loosely used that a generally accepted definition is impossible. They reason that depending upon the activities assigned to it, Systems and Procedures implies a broad range of meanings. For example, when dealing with clerical operations, systems is defined as "the mechanics by which clerical functions are performed"; and procedures, "the formal instruction written and charted, which governs the operations comprising a system." In cost accounting, system is a plan and the various routines and actions to be followed are procedures. On the other hand, those who advocate the "freeing" of Systems and Procedures from clerical routine and accounting detail, define systems as a means by which a company is to operate and to accomplish its objectives. Procedures are written and oral instructions for implementing the system.

The present confusion in definition is caused by poor communication. In the first place, let us assume that Systems and Procedures is, wherever placed and however identified, concerned with organization effectiveness. Secondly, System and Procedures deals with administrative processes which contribute to the efficiency of decision-making coordination and over-all management. Thirdly, it encourages a comprehensive knowledge of an organization and its dynamics. In this setting, Systems and Procedures is a constituent part of general administration, which is contrasted to such specific areas as engineering administration or marketing administration. It is concerned with achieving optimum coordination and effectiveness for a total organization.

Systems and Procedures in this sense implies a function devoted to the analysis of working processes and the over-all analysis of a series of organized operations that involve a group of people. It identifies organizational operations and the order and timing in which they should inter-play for optimum results. It provides an understanding of essential relationships among functions and operations. It deals with structural as well as operational decision-making bodies, communication media, and group

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The Function Grows

Let us begin with a brief history of Systems and Procedures. It seems that Systems and Procedures was originally regarded as a function dealing with improving methods and curtailing waste in the manufacturing area. It was basically a problem of mechanics and cost, having apparently little relationship with the over-all management scheme. Its development, however, led to the establishment of Systems and Procedures to simplify *clerical* operations and to regulate accounting routine. Other activities became allied to Systems and Procedures as the outlook of management changed. Forms design, time and motion studies in clerical operations, space and facilities planning and control, office machine evaluation, records management, and other activities of a clerical, technical, and service nature were added to the Systems and Procedures function.

Through procedure writing, Systems and Procedures established control over clerical and accounting operations, thus exercising influence over operations throughout a company. Systems and Procedures was then looked upon not only as a means to improve administrative work of a clerical and mechanical nature and to regulate routine, but also as a control instrument—controlling performance and establishing work measurement. This latter task was regarded by management as akin to internal auditing. To summarize, Systems and Procedures work, during its initial development, was regarded as a work-simplifying, cost-saving, and control instrument in administration. Organizationally, it was placed in office management, administrative services, accounting, or internal auditing.

The Concept Changes

With the more recent changes in management concepts, a maturity in Systems and

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Procedures can be observed as it expands into organization planning, administrative systems, design, and management analysis. In government agencies, administrative analysis is considered to be a necessary function. Administrative analysis is the study of causes and solutions of administrative problems. It includes planning and improving administrative practices, methods, and organization structure. An administrative analyst is one who approaches these problems through practical scientific research techniques and creative thinking. He identifies the problem, determines the causes, and develops solutions. Administrative analysis is not confined to mechanics and cost; it is concerned with organization management, organization structure, control and planning, budget control, procedure writing, and statements of policies and programs.

In industry, Systems and Procedures practitioners find it difficult to separate the study of mechanics and cost from the analysis of organization. Indeed, the organization structure and its attributes are more basic and conducive to the effectiveness of an organization than mechanics and cost. The growing complexity of industrial organization, both in size and operation, and the rise of "managerial professionalism" further warrant the need for management analysis and instruction writing, the pronouncement of policy, and the design of major administrative systems to direct a complex operation. It is through this type of change in management concept and perhaps through a re-examination of the meaning of organization effectiveness that Systems and Procedures, though grossly inadequate at first to cope with this task, has become both closely associated with management and more mature. To summarize, it is now thought by Systems and Procedures writers and practitioners that Systems and Procedures has grown beyond the original boundary. It embraces organization planning, systems and procedure analysis, administrative systems design, and management analysis. Organizationally, it has become a staff function, reporting to a chief executive of an organization.

The Interpretations Differ

There is, however, a basic disagreement. It is one of definition. What is Systems and Procedures? Is it necessary to define it at all? There are those who believe that Systems and Procedures as a term is so loosely used that a generally accepted definition is impossible. They reason that depending upon the activities assigned to it, Systems and Procedures implies a broad range of meanings. For example, when dealing with clerical operations, systems is defined as "the mechanics by which clerical functions are performed"; and procedures, "the formal instruction written and charted, which governs the operations comprising a system." In cost accounting, system is a plan and the various routines and actions to be followed are procedures. On the other hand, those who advocate the "freeing" of Systems and Procedures from clerical routine and accounting detail, define systems as a means by which a company is to operate and to accomplish its objectives. Procedures are written and oral instructions for implementing the system.

The present confusion in definition is caused by poor communication. In the first place, let us assume that Systems and Procedures is, wherever placed and however identified, concerned with organization effectiveness. Secondly, System and Procedures deals with administrative processes which contribute to the efficiency of decision-making coordination and over-all management. Thirdly, it encourages a comprehensive knowledge of an organization and its dynamics. In this setting, Systems and Procedures is a constituent part of general administration, which is contrasted to such specific areas as engineering administration or marketing administration. It is concerned with achieving optimum coordination and effectiveness for a total organization.

Systems and Procedures in this sense implies a function devoted to the analysis of working processes and the over-all analysis of a series of organized operations that involve a group of people. It identifies organizational operations and the order and timing in which they should inter-play for optimum results. It provides an understanding of essential relationships among functions and operations. It deals with structural as well as operational decision-making bodies, communication media, and group

dynamics. Hence, the purpose of Systems and Procedures is the optimization of an organized effort in running a business or in performing a task. It cannot be divorced from the policies or the structure of an organization. It must not, therefore, get bogged down in the analysis of clerical operations and technical details, for these are but one aspect of an organization's operations. It should concentrate on basic processes in the general area of management, or in a specific sector of management such as a reporting system for the company or a product-development process for engineering. In the analysis of a process, it throws light on the complexity of relationships among major functional areas and uncovers problems of group dynamics of management. It makes objective studies of over-all organization and administration problems for top management.

To summarize, Systems and Procedures accentuates over-all performance, stresses interdependence among functional units, and emphasizes improvement in administrative technique. A "system" must be interpreted as an integral whole, either of a working process or of an organization composed of interconnected functional units. A "procedure" on the other hand, is a prescribed method or technique for performing a certain task, thus insuring the effectiveness of a system. Any technique—machine as well as mechanical models—which contributes to the refinement of an administrative process is no doubt related closely to Systems and Procedures. In other words, if one accepts the assumption that Systems and Procedures deals with administrative process, Systems and Procedures is a component part of a coherent whole—the field of general administration. Being so, not only does Systems and Procedures have an assemblage of conceptual knowledege, it is also equipped with skill and technique to accomplish its task and to encourage management support and organization acceptance. To differentiate when Systems and Procedures is employed in office management, accounting, or other office operations, it should be called office systems and procedures or accounting systems and procedures. Hence, as in administration, general systems and procedures is differentiated from specific systems and procedures.

Conclusion

Systems and Procedures may be either a constituent part of an organization responsible for the analysis of administrative process in a large business organization or a functional unit concerning organization effectiveness in a small firm. Systems and Procedures may practice such activities as organizational analysis and planning, administrative process analysis, policy writing, and systems and procedures preparation. Its meaning in a company must be clearly understood. Within a company, it should mean only one thing, not several.

One may question the basic need for a company to have a staff unit to deal with general administration. Is it not true that organizing and directing are the basic responsibilities of all managers? When, then, is there a need for additional personnel to strengthen this effort. Are Systems and Procedures people perhaps more accurately described as "procedure writers" who record the instructions of the managers? These are questions often posed. They should be resolved.

Any organization, industrial, governmental, or social, is basically a "human" organization designed for joint performance. "Administration" represents a body of conceptual knowledge, skill, and wisdom. It is an extremely complex and specialized field. Management must possess this knowledge and must understand its organization objectively. While managers are subjectively involved from day to day in organizing and directing the affairs of the company, a group of administrative specialists can concern themselves with the objective analysis of effective administration.

Systems and Procedures studies the interdependence of functional units. It aims to maintain functional coherence within the whole. It is through over-all analysis of administration, not through the mere recording of specialized methods and procedures, that Systems and Procedures makes its contribution to the success of an organization and identifies its rightful place within the company group. **s/p/a**

Systems Work in Eastern Europe

Tibor Keler

▶ The Eastern European States (East Germany, Poland, Czechoslovakia, Hungary, Rumania, Bulgaria) all became part of the Communist bloc after World War II. After a short interim period as a four-party democracy, the transition to a Communist government came in 1947-48. The basic principles of economy in all these states are, therefore, identical to those applied in the Soviet Union. There is a broad exchange of experience among these states in all fields, as well as in the area of systems and procedures.

The aim of this article is to summarize the writer's observations during the past decade as a systems man first in eastern Europe and then in the United States and to point out major differences in educational requirements and in systems work in general. Because of the nature of the material, the first person, narrative style is used.

I gained my experience in Communist Hungary where I worked from 1948-1956 in various sections of the state-controlled economy.

My last position was as Chief Comptroller of the Ministry of Transport and Communications, Department of Motor Vehicles, from 1953 through 1956. During these years, besides working on systems and procedural problems of the Department, I prepared a study concerning the accounting system of the Czechoslovak Auto Transportation for the Research Institute of Auto Transportation in Hungary. I had further the opportunity to study some accounting and procedural problems of East Germany and Poland, mostly related to the field of auto-transportation. I also had the opportunity to study the professional literature of the Soviet Union. Occasionally I was asked to prepare consultant opinions on some organizational and cost accounting problems of companies belonging to the Ministry of Defense.

Before going further in this presentation, it is necessary to remind the reader that we are concerned here with a state-controlled economy where private property or ownership (with negligible exceptions) is excluded and all enterprises are state owned. Regular control is given to the respective ministries; the over-all supervision and outlining of general directives and principles is carried out by the Treasury Department, Federal Bank, and Central Bureau of Planning.

Educational Requirements

During the first years of Communist rule in Eastern Europe, the Treasury Department developed regulations—based on Soviet experience — which included details about educational requirements for the systems profession. According to these regulations, any systems job in companies, trusts, banks, ministries, or treasury department is restricted to persons who have had formal education consisting of three possible grades. Anybody applying for a systems job or holding a position as a systems analyst has to pass examinations within a certain period of time; the deadline date, for those already holding a systems position, was 1958.

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A special bureau within the Department of Treasury, in cooperation with the University of Economic Sciences in Budapest, worked out an educational program, consisting of the following three grades:

Grade I, A basic course in accounting, systems, and statistics. Approximate duration, one year.

Grade II, Advanced course, including the following subjects:

1. Political economy
2. Accounting (synthetic and analytical), systems, and statistics on a company level
3. Planning (production, productivity, budget, cost)
4. Law

This course requires approximately two years of study, not counting the basic course, and the successful passing of a series of written and oral examinations. A maximum of 6 hours of written test problems is given for each subject.

Grade III, This is the highest step in the formal education program. Admission requirements are the successful passing of Grade II or a master's degree in business administration and five years of experience in systems and accounting. Subjects for Grade III are:

1. Political economy (Marxism, Leninism)
2. Accounting and systems on the level of national economy for each major section of the economy, such as:
   a. Industry
   b. Agriculture
   c. Transportation and Communication
   d. Construction Industry
   e. Commerce
   f. Institutions supported by state budget (scientific institutes, hospitals)
4. Auditing the national economy (in the same groups as mentioned before)
3. Planning the national economy (in the same groups as mentioned before)
5. Law

This course requires approximately three years of study and the successful passing of written and oral examinations in each subject. Both Grades II and III are difficult examinations but Grade III presents even higher requirements to the candidate. Examinations are held before a committee consisting of a chairman and two professors; the selection of the committee is kept secret until the day of the examination.

No credit was given for degrees obtained under a preceding type of government, which means that those few who gained their degrees before the end of World War II and maintained their positions as systems analysts had to start over again. I, who received my degrees in business administration and economics before the end of World War II, started studying again in 1950 and passed successfully the last examination in Grade III in March, 1956.

In December of the same year, I arrived in the U.S.A., and I am grateful for the opportunity to work in electronic data processing, a most interesting field.

From the foregoing it can be noted that emphasis is placed in the educational program on two subjects:

1. Accounting
2. Political Economy

Systems and accounting are closely related and regardless of whether the systems man has specialized in accounting, planning, time studies, technology, or any other branch of systems work, the above mentioned educational requirements are applied to everybody.

The other subject, political economy, includes detailed studies of Marxian economic theory expanded by teachings of Lenin and Stalin, up to the evaluation of resolutions of the congresses of the Bolshevik party. Subjects like the maintenance of equilibrium between heavy industry and consumer goods production, the support of agriculture, and the increasing percentage of production waste were taught in great detail.

Grade III is normally required for leaders of the systems group. Systems analysts generally must have passed Grade II, sometimes combined with other specializations such as engineering.

Systems Concept

The prime goal of systems work is to increase the economic efficiency of a company. If there is a choice between two or more methods, the more economical should be selected. Basically any systems work should be built on the main principle of Marxian theory: To raise the standard of living of the working people through increased productivity.

In a socialized economy, where all enterprises are state-owned, the degree of standardization is very high. Any existing company or enterprise to be created has to function according to standards laid out in detailed plans. Its organizational structure is predetermined according to the regulations of the ministry to which the company belongs. The type, the source, and the price of raw materials; the technological process of manufacturing; the distribution of products; and the method of transportation are all contained in detailed production plans. The number of employees and workers, the job descriptions, and the ratio of productive to non-productive employees are outlined exactly in the organizational manual of a company and prepared before a company starts to function. The responsibilities (and punishments) of the director, chief engineer, and chief acountant are exactly prescribed by the Council of Ministers.

The operational fund (capital) is a part of the budget of the ministry concerned and is transferred into a special account opened at the Federal Bank for the given company. The accounting system is predetermined by the accounting department of the responsible ministry. The percentage of total cost in relation to the total production value is predetermined, which gives the percentage and the absolute amount of planned gain or loss.

A great number of ministry regulations direct the work procedure of each department or group within the company, such as quality control, cost accounting, statistics, and preventive maintenance. Most of the activities within a company have to be performed, recorded, and audited according to standard rules issued by the corresponding bureau of the ministry.

Thus it seems that the significance of systems work is very small since, theoretically, all details of work to be performed are predetermined. What then is the task of a company systems analyst?

1. His first responsibility is to see that the rules and regulations are properly applied and carried through.
2. Procedural problems not covered by standard regulations have to be worked out in detail.
3. Because of the high degree of standardization, some procedures cannot be applied to a particular company hence it is justifiable to permit exceptional procedures, which have to be proposed by the company systems analyst.
4. If certain procedural changes or improvements are required in an existing system, it is the task of the analyst to prepare a case study and to submit his proposal to the ministry concerned. If a change affects only a particular section of the industry, the approval of the ministry concerned is sufficient; if it affects more sectors of the economy, it has to be approved by the Treasury Department.

These are the main responsibilities of a systems analyst, and since they are based on the principle that the one who is responsible has to be given the opportunity to exercise authority in order to accomplish his task, it is evident that responsibility and authority go together.

To illustrate some of the enforced standards, I offer the example of the compulsory use of accounting systems regulated by the Department of Treasury. The frame of any accounting system consists of 9 major classes of accounts. Each of these is subdivided into groups and accounts which have the same meaning in statistical and financial reports of any company. For instance, account No. 5211 contains the balance of the wages of industrial workers of any company. The frame of the accounting system in East Germany and Czechoslovakia is built on a similar basis.

The Place of the Systems Group within the Company Organization

The systems group organically belongs to the accounting department of a company.

The head of the systems group reports to the chief accountant. This is the situation in Hungary and Eastern Germany. The definition of systems work and the position of the systems group within the company organization is not final. The responsibilities of systems men have undergone constant changes in the Soviet Union and in Eastern European countries. One fact remains, however: his importance is constantly increasing.

Systems work is generally criticized as being too accounting-oriented and as being mostly concerned with procedural problems. Systems work should be equally concerned with technological problems and proper control of production procedures.

There is a general trend toward placing the systems group directly under the supervision of the Board of the Workers Council, which is the governing body of a company. This would practically mean that the systems analyst would report to the director of the company.

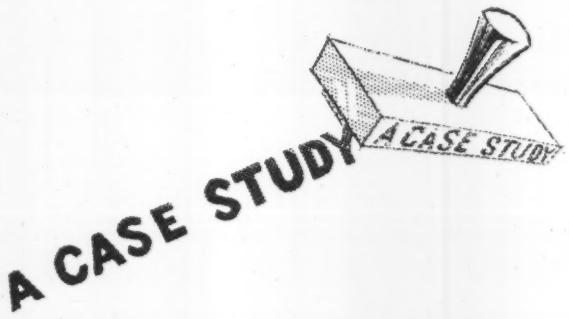
On the whole, the level of automation is lower in the Eastern European States than in the United States. Punched card equipment represents about the highest degree of automation. Czechoslovakia is the only one which, according to my knowledge, produces an electronic computer SAPO (samo-pocitac), invented by Mr. Svoboda.

In general I find the major differences in systems work between the United States and Eastern Europe are:

1. Formal education
2. The authority of systems men
3. Specialization

The systems man in Eastern Europe is required to have a formal education and has a higher degree of authority. The systems analyst in the United States has less authority and is therefore required to do a more creative job with more individual thinking. On the other hand, the systems analyst in the United States has to do a constant selling job and if his efforts are not met with proper understanding, the best ideas can be lost.

s/p/a



▶ Since the manufacture of missiles for the United States Navy involves the working of many types of metals, plastics, and hydraulic and electrical components, the adequate stocking and maintenance of manufacturing tools and supplies becomes costly. Large quantities of standard catalog tools and supplies, as well as special tooling required to make specific parts, are critical to the maintenance of the contracted production level. In order to establish adequate control of this inventory, a series of procedures has been developed and is being installed at the Raytheon Company's Lowell Plant.

A plan for an integrated system was developed and conveniently broken into four parts for installation:

1. The mechanization of the tool inventory control system
2. The development of a tools and supplies catalog and coding system
3. The capture of original data for further processing as a by-product of the creation of process sheets
4. The installation of related manual procedures, both to implement the mechanization and to cover those areas where mechanization was not feasible.

I. *The Mechanization of the Tool Inventory Control System*

The inventory control area was selected as the first area for mechanization since it offered the most immediate tangible benefit. In addition, it was essential that coded description cards be created to produce the tools and supplies catalog. This catalog establishes the coding used in subsequent operations. The mechanized tool inventory control system will be discussed in detail in this paper.

A Procedure For Tool Inventory Control

John J. Murphy

II. *The Development of a Tools and Supplies Catalog and Coding System*

In order to process data mechanically, a code was developed and applied to each item of inventory. The code, together with descriptive wording, vendor information, etc., was key punched into a master description card. The cards were then tabulated to produce a reference catalog for the use of methods engineers in coding tools called out on process sheets.

III. *The Capture of Original Data as a By-Product of the Creation of Process Sheets*

The process sheet (which describes what is to be done, on what machine, and with what tools) contains much of the basic information to be used at a later point by the Production Control and Manufacturing Departments, as well as the Manufacturing Tools and Supplies Group. The tools called for in each operation are identified on the process sheet by the code found in the tools and supplies catalog. The process sheet is typed on an electric typewriter with tape output, which is reused when up-dating process sheets. Simultaneously and automatically, a selected output tape is prepared. This tape is converted to a series of cards which are used in Production Control and Manufacturing applications. A tool requirement card is also prepared for use in the preparation of tool kit lists and for the creation of a kit loan card which authorizes the machine operator to withdraw the kit from stores. The requirement cards are run to prepare a list of new items which must be purchased and added to the inventory. Thus, the mechanized system becomes integrated from the creation of the process sheet through the inventory control system.

IV. *The Installation of Related Manual Procedures*

The creation of these mechanized systems requires a multitude of written instructions for operating personnel. Many other procedures, not directly related to the mechanical processing, are being developed to complete the tools and supplies picture. These procedures are being incorporated as the mechanized steps are proven and installed.

Let us consider the mechanized inventory control system in detail. This program was selected as the subject of this paper because it is a system capable of installation in a wide variety of manufacturing organizations as a system in itself, without the installation of the integrated tape system described above.

The tool inventory control system, which is currently being installed at our plant, follows basically the conventional inventory control set-up; however, several other factors have been introduced:

1. The master description card has multiple uses in the system. It is the basis of the tools and supplies catalog; it is used in the preparation of the purchase requisition (see Item No. 4); it is used for the cyclical physical inventory.
2. Only active inventory balance cards are used in this system. Mechanically, the activity cards for a given week are

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matched against the previous week's active inventory balance cards. The few remaining activity cards, for which there had been no activity at the time of the previous week's reporting, are then manually matched to the master card in the inactive file. This simplified method can be used since over 90 per cent of our activity is on repeat items.

3. By periodically listing the inventory balance cards which have remained in the inactive file for a number of weeks, we are able to review these items for obsolescence, thus enabling us to reduce our inventory and storage requirements.
4. Through comparison of a predetermined re-order point with the inventory balance, items are selected for requisitioning. When matched with the master description card, a purchase requisition is prepared in detail. This requisition is then reviewed by the inventory supervisor to determine whether the item should be requisitioned. If so, the requisition is signed and sent to Purchasing.

The following are the steps involved in performing the tool inventory control function:

A. *Daily:*

1. Key punch and verify master and inventory balance cards for new tools and supplies added to the system as a result of revised or new processes.
2. Key punch and verify transaction cards for stores issues, receipts, adjustments, and tools which have been removed from active use while undergoing repair.
3. Follow-up ordered tools.

B. *Weekly:*

1. Sort transactions by tool item code number.
2. Merge with *active* inventory balance cards.
3. Manually, pull *inactive* inventory balance cards for unmatched transactions, step No. 2.
4. Produce updated inventory balance cards showing:
   a. New inventory balance
   b. Quantity to be ordered (i.e., using maximum and reorder quantities shown on balance card, calculate quantity to be ordered for tools which have reached the reorder point)
5. At the same time, produce activity report showing old inventory balance, transactions, and new inventory balance for each tool.
6. Sort out all updated inventory balance cards which indicate that an order should be placed.
7. Manually, match these against the master description cards.
8. Using master and updated balance cards requiring an order or reorder, produce an "on order" card and a purchase requisition for each tool.
9. Send new cards and purchase requisition to the Tool Control Group.

C. *Costing Procedure (Weekly):*

1. Sort "on order" cards from old balance and order transactions cards.
2. Calculate total cost for each transaction using the last unit cost (per the inventory balance or receipts cards).
3. Sort above by card code by account number.
4. Prepare accounting report showing cost of disbursements by account number.
5. Send accounting report and transaction cards to Tool Control Group.
6. Tool Control files the cards by type of transaction, by tool item code number, and distributes the reports to the interested departments.

   The purchase requisition, described in step No. 8 above, is a 5 by 8 inch, two-part form. The original is a paper copy and the carbon is a hard copy. These are reviewed in Tool Control and subsequently sent to the Purchasing Department.

   Purchasing data, such as purchase order number, vendor, unit price, promised delivery date, etc., are entered on the requisition by the Purchasing Department. (This is done

before the forms are separated.) When the requisition has been completed, the hard copy is returned to Tool Control and the paper copy is retained for filing in the purchase order folder.

Upon receipt of the hard copy of the purchase requisition in Tool Control, the "on order" punched card is pulled from file and punched with pertinent data to indicate that the tool has been ordered. The purchase requisition copy is then filed by promised delivery date and subsequently is used for follow-up of the ordered tool.

D. *Monthly:*

1. All active inventory balance cards are collated with the last week's transaction cards. The activity report at this time represents a complete listing of all tools showing the last activity date during the month and the ending balance.
2. A second report, listing inactive items, is used as a guide in determining which tools have become obsolete.

In addition to the above, punched card procedures have been established for:

1. Cyclicly performing a physical inventory.
2. Controlling the issuance of loaned tools. This procedure relates to the paper tape created at the time the process sheet is typed. From this tape, a tool loan card is created so that the machine operator on the factory floor may draw from the stores area the specific kit of tools required to make that part. This card includes a receipt stub which the operator retains.
3. Analysing causes of defective tooling so that corrective action may be taken by our Tool Design and Tool Procurement Groups.

Installation of the System

The system described above was designed to provide the accurate control essential to continuous operation. This system provides that control. By obtaining as a direct by-product of process sheet preparation a list of tools and supplies to be used in the manufacturing operations, we are assured that all items essential for production are available when needed. By processing active inventory records only, we can prepare lists of non-active items, thus decreasing capital and space requirements. By establishing a mechanized comparison of actual inventory to desired minimum, we can produce a purchase requisition wherein the accuracy of the description is guaranteed.

The system described is a major program requiring several stages of installation. Since time is limited, the different phases are being introduced simultaneously in several areas, but the final integration of the system will not take place until some months later. A rough schedule is as follows:

Step 1

a. Prepare punching slips, including numerical codes for master description record.

b. Develop programming for typewriter with tape output.

Step 2

a. From the master description card, run tools and supplies catalog. Convert tool description to a catalog code as process sheets are revised for other reasons.

b. Add quantity cards to a selected group of inventory records.

c. Begin typing process sheet changes. Hold selected data tapes.

Step 3

a. Convert all inventory to the card system producing actual balance lists (not purchase requisitions).

b. Continue conversion of process sheets to punched tape.

Step 4

a. Discontinue actual balance listing and produce purchase requisitions.

b. Convert selected data tapes to material requirements cards and integrate these cards into the system.

The final step is expected to be completed in the later part of 1959. **s/p/a**

EDP in the Retail Industry

Ethel Langtry

▶ Before developing the main theme of this presentation, it might be appropriate to expand upon the background of the National Retail Merchants Association. Formerly called National Retail Dry Goods Association, it is a "trade association" for retail organizations. It has been in existence just under 50 years and has approximately 11,500 retail organizations throughout the world as members. The majority of the members are in the Department and Specialty Stores category, but the Association also includes "chains" and variety stores such as Sears, Roebuck; Montgomery Ward; W. T. Grant; and Woolworth. Notice the variance in the size and concept of the retail organizations included in the membership of the National Retail Merchants Association.

The Association's division, the Retail Research Institute, is relatively new, having been established about two years ago. The need for basic research in the retail industry led to the establishment of this Institute. Processing electronic data is only one portion of the work of the Institute. As additional research work, we are conducting a study of organization and research techniques currently used in the retail industry. However, electronics is perhaps the most fascinating of our projects.

A store must compile millions of facts each year. This is primarily done manually. (Over 50 per cent of total expenses are for payroll.) Some ten years ago, a solution to this problem seemed close at hand. Electronics would do the job. The same speed of computation which guides a missile in its flight or solves a mathematical problem in minutes instead of years, would do the retailer's figuring and record keeping at a small fraction of the current cost. But now, ten years later, retailing still has not, as an industry, advanced in the use of EDP equipment.

Since other industries have grasped the opportunities inherent in electronics, why has retailing lagged? Is it the inability of retailers to communicate their needs and state their problems to equipment manufacturers? Certainly there has been much misunderstanding on the part of retailers of the capabilities of electronic data processing equipment. In turn, equipment manufacturers have produced machines which they believed would do the job for the industry only to learn that the industry was finding them too expensive, too complicated to operate, or not suitable for a tremendous amount of input, relatively little computation, and a vast amount of output. This does not mean that EDP will never succeed in the retail industry. Retailers who have been pioneering in this field for many years are optimistically looking forward to a "break-through." A number of these retail pioneers representing a substantial segment of the industry (over 6 billion dollars in retail sales) have banded together and formed the Electronics Committee of the Retail Research Institute. It is the view of this Committee that EDP equipment will not replace all of the conventional

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bookkeeping, accounting, and tabulating machines or paper and pencils used in retailing today. However, there is no question but that the intelligent application of electronic devices will be an important factor in stemming the rising cost of clerical functions. To this end, the Committee has established three aims:

1. To develop the applications to which this equipment can be applied most advantageously in a retail organization.
2. To work with manufacturers of EDP equipment in establishing specifications for equipment to do the retailing job.
3. To disseminate information to the industry concerning the status of EDP both as to hardware and applications.

The Committee meets two days every month and has already accomplished a great deal, but, of course, much more still needs to be accomplished. Although there have been many installations of EDP equipment in retail stores, few have been completely successful.

The Office Problem

It appears that our methods and even our organizational concepts must be changed if we are to use EDP to the greatest advantage. For example, stores have traditionally broken down their office functions into work centers, each work center operating as an entity, and each responsible for a particular function and the cost of that function. When we first thought of automating, we thought of maintaining relatively the same type of organization with each function "costing out" on EDP equipment. We have learned, however, that the entire process must be integrated if we are to obtain any real savings or even break even. Any one of these functions may not pay off; the payoff is often in a by-product or in the savings in a subsequent operation. There is a further problem; that is, where to start to apply EDP in a retail operation. A number of retail organizations feel that the appropriate place is in what is commonly termed the "office area." They take the approach that the cost in this area has been clearly defined for a number of years and the personnel involved—the controller and his staff—are most receptive and sympathetic to installing new systems and procedures. They further point out that in particular, the problems of handling charge accounts are increasing in retail stores. Everyone is getting on the "credit" bandwagon as illustrated by several recently announced credit plans of the banks.

The number of charge accounts handled is very sizable. A recent survey of NRMA member stores shows the following:

Size Store	*Active Charge Accts.*
50 million plus	250,000 - 400,000
20 to 50	100,000 - 140,000
10 to 20	50,000
5 to 10	30,000 - 40,000
2 to 5	15,000

Each charge account has an average of 3 to 5 transactions per month. Each transaction requires approximately 46 digits of information.

Records must also be kept of sales by department, by store, and type of sale. In addition to charge sales, there are C.O.D. and cash transactions to be recorded. Tax records must be accumulated for local and Federal agencies. Many retail organizations have to cope with trading stamps which are traditional in some areas of the country, particularly the middle west. Returns of merchandise must be recorded and credited to customers' accounts or cash refunded. There is further the problem of accounting for merchandise ordered, the receipt of merchandise, and the ultimate payment invoices from vendors. This information must then be accumulated by the selling departments for appropriate debits to inventory. All of this illustrates very well the need for EDP equipment and procedures integration in the office areas of a retail store.

The Merchandising Research Problem

Although office record keeping costs are approximately 3 per cent of sales in most stores, there are those who maintain that the office area of a retail store is the last place in the world to start using EDP equipment. They point out, very logically, that in most stores systems and procedures in this area have been carefully analyzed, exception techniques worked out, and that, as a result, it

is difficult if not impossible to gain any substantial savings through EDP equipment. Most equipment manufacturers when faced with applications of the retail office are hard put to develop an EDP system that can break even. The opponents of automating the retail office first point out that to establish any effective EDP system in this area involves automating accounts receivable, and that this involves customer relations. They feel strongly that the last place a store should start to experiment is with its customers. Customers could be lost easily, they maintain, if they were annoyed with errors and delays in their bills which might result from converting to EDP. A better place to begin EDP, they suggest, is the "merchandise area," an internal or off-line area. It is amazing how little the average merchant knows about the buying habits and preferences of his customers as to size, type, colors, styles, and the trends in his locality. Certainly he has some idea about it or he could not stay in business but there is much more to know. The information required for successful competitive merchandising involves the calculation of trends, comparisons with previous years, and relationships with other merchandise. A computer is better suited to perform these calculations. The potential is great. Markdowns alone represent 6.5 of net sales. In this area of information manipulation there is also a minimum amount of input and maximum amount of calculation, whereas accounts receivable and accounts payable require relatively little calculation and are areas in which the input problem is acute.

Point-of-Sale Devices

Our problem, then, is how to reconcile these two points of view and the applications to EDP equipment so that EDP will pay off in retailing. To accomplish this, the Electronics Committee has tried to break down the functions of a retail organization, tackling each segment independently but constantly keeping in mind the necessity for its integration into the whole.

Perhaps the first of our problems is input of data. Most of the information for a retail electronic data processing system originates with a salesclerk. The salesclerk currently records this information in a cash register and/or on a sales check. On a charge transaction, she lists the customer's name, address, and sometimes an account number as well as a description of merchandise, price, and tax. This is done in the presence of the customer at the place of sale. Salesclerks are not machine operators. They often work under difficult conditions, many times with interruptions from other customers wanting to be served. Such conditions do not stimulate accuracy. But if information is to be captured at the source, here is where it must be done. Because of this, a number of manufacturing firms have developed point-of-sale recorders. These machines substitute for cash registers and generally contain interlocking devices to control the sequence of information imprinted and to transmit it to a punched paper tape unit nearby. The tape is processed daily either directly by a computer or through a tape to card converter and a card activator computer.

On the surface, this sounds like a satisfactory solution to the input problem, but actual study of this system indicates many problems. At a recent Electronics Committee meeting, these problems were discussed with the manufacturers of point-of-sale equipment, the major problem being accuracy. In an attempt to capture the information in the proper sequence, a series of interlocking devices has been built into the recorders, thus necessarily making them more complicated to operate. Even when a clerk is aware of an error, the method of correcting it on this type of device is difficult and can be a frustrating experience for the customer who is waiting for her receipt, as well as for the salesclerk. Our experience has shown that a customer will spend hours selecting merchandise but once it has been selected she becomes irritated at any delay in completing the transaction. None of the present devices has the ability to correct only a portion of a transaction. For example, if at the end of recording a sale, a clerk makes an error in entering her identity number (although the rest of the transaction is entered correctly) she must void the entire transaction and re-enter all the information. In addition to the situation just described, the new type of sales record presents a problem of training personnel. Retail stores now have extensive and costly training programs. This is particularly true at peak seasons such as Christmas and Easter. Training requires an average

of three days. If you multiply this "unproductive" time by the number of salesclerks involved, you will see that it means a tremendous expense. Training a clerk to operate a point-of-sale device will require two to three times as much training.

Other things to note about point-of-sale recorders presently on the market are:

1. They do not contain any alphabetic information; therefore all information must be coded numerically. Although there are a number of satisfactory methods for coding the information, it creates another possibility for error plus the work involved in maintaining and interpreting coded information.

2. There is a need for hard copy. Assuming everything else works satisfactorily and all the information required is captured on punched paper tape, there is still a need for a written document in a substantial percentage of store transactions.

A written document is required on all "send" transactions, to accompany the merchandise to its destination and to provide information where there is an out-of-stock or order-filling problem such as in the case of warehouse merchandise. In addition, a vast majority of stores feel they must have a signed hard copy on charge transactions as verification in case of adjustments or to substantiate that the purchase was actually made by the customer billed.

Cost

Finally we come to the problem of the cost of this new equipment. The majority of these input devices must be purchased, not rented. The prices average $4 to $5 thousand each. As an example of the investment involved before a store can think about central office processing equipment, those with a volume of approximately $50 million per year would require about 500 of these devices at a total cost of approximately $2 million. This does not take into consideration the loss which must be sustained on current cash register equipment, a large percentage of which will not be fully depreciated.

These, then, are some of the reasons why retailers do not feel that point-of-sale equipment is necessarily the answer to their information processing problems although there are certain areas where the equipment can be used to advantage; for example:

1. In high transaction departments such as notions and drugs where the merchandise is bulk marked or not marked and hence no tickets are used, but where it is necessary to maintain statistics on sales by categories or classifications for the guidance of buyers. In this area the information can be captured on the point-of-sale recorder.

2. In low-transaction, specialized departments such as furniture, where present mechanical registers do not provide sufficient totals for sales information for all the clerks; hence, one point-of-sale recorded with unlimited totals could replace two or more standard registers.

3. Active interselling areas such as college, "south" shops, and special areas in branch stores where merchandise from 10 to 30 departments is represented and hence present methods of recording sales are cumbersome and costly.

The Solution

So much for the problems. What is the solution?

To solve the over-all problem of input, retail stores are thinking along the lines of the banks; that is, character recognition equipment. However, unlike the banks where much of the information can be recorded on a check when it is printed, most of a store's information must be entered at the time of the sale. This makes optical character recognition equipment appear to be more desirable than magnetic, for if the present register equipment can be altered to produce a clear imprint of certain necessary information on a tab stock salescheck, and the additional information is written in by the clerk on this same salescheck, the card checks can then be processed by optical reading equipment with the necessary information automatically punched from the imprint into the same document. These documents can then either be processed on card input computers or,

when a faster card to tape converter is developed, it may be feasible to convert to tape and the tape used to activate computers.

The computer could then be used to compile and calculate all the statistical information, including the preparation of customer charge accounts in summary form. The actual card salescheck could be sorted on tabulating equipment to the customer's account, and a summary bill prepared by computer. This, of course, is merely a concept which is far from perfect and in which there are many facets to be worked out. Optical sensing equipment still has not reached the degree of accuracy one would like to see, and the cost of revising present cash register equipment has not been established; but the idea does have real potential in the retail industry.

These remarks about optical character reading are not meant to rule out magnetic character systems entirely. It may well be possible to develop printers and reading equipment based on the magnetic principle to do the retail job. In fact, a large equipment manufacturer has recently completed an experiment involving a West Coast department store to determine the feasibility of a magnetic character reading system.

There are, of course, many other possibilities for automating information handling in the retail industry. Regardless of what the system technically may be, that is, optical, magnetic, fluorescent, or perhaps something still unknown, the principle of character recognition is likely to be the solution to the input problem of a retail organization, as it is in the banking business.

You have probably noted that this article has stressed the problem of input rather than central office equipment. This is because those of us who are working with this problem in the retail industry feel quite strongly that once the input problem is solved, any number of pieces of gear currently available or in the development stage can be used in the over-all job. But first, we must get accurate information into the system and at a cost we can afford. As one of our Committee members recently said, "We don't want to be inefficient faster." The industry cannot afford failures; therefore, a great deal of planning lies ahead before more EDP equipment is installed in retail organizations.

s/p/a

Book Review

Production Control, (Second Edition) *by Franklin G. Moore; McGraw Hill Book Company, 655 pages, 1959, $8.00.*

This second edition continues the threefold objective of the first. Competently, it describes the job of controlling production, compares methods, and analyzes methods to be used in particular situations.

All of the old material has been rewritten in a new conversational style, lending exceptional value to it for anyone wishing to brush up on production control. There is constant reference to up-to-the-minute practices, problems, and designed solutions among various large, medium, and small companies. At all times the reader is under the impression that he is receiving information and perspective from within the framework of broad, firsthand experience.

There is a considerable enlargement of the sections dealing with forecasting, estimating, the learning curve, manpower loading, and inventory control. A chapter on the use of tabulating and computer equipment for production control is brand new, as are chapters on operations research and linear programming. These chapters are well worth looking into for anybody having an interest in production and inventory control.

The one disappointment experienced by this reviewer was in reading the tantalizingly light references to the problems of interplant production control. It would seem that an opportunity to be the first to deal thoroughly with such questions in print was missed. However, it must be admitted that this book takes us further into the area than most.

The continuing trend towards tighter control over operations has, for the most part, resulted in considerable economies in the production and inventory areas, as well as in better customer service. An understanding of the methods of such control, such as this book provides, is worth the effort of any Systems man to obtain. *(Reviewed by Michael Miskulin, Underwood Corporation, and member Empire State Chapter, SPA.)*

Reporting And Handling Project Priorities

J. T. McGovern

▶ We have all heard stories about the shoemaker's son who wears "beat up" shoes and the barber's son who looks like a shaggy dog. In how many offices do we find that the Systems and Procedures group need a little "systematizing" of its own procedures?

Some Systems and Procedures groups operate on an informal, almost uncontrolled basis. Information they pass on to management (who is working on what project, stage of completion, and anticipated final completion) is sporadic and, when provided, sketchy. Other groups are so burdened with project assignment and status reporting procedures that the time left to do systems work is reduced. In some Systems and Procedures groups we find a steady influx of projects from management, each "red hot." Because the last project received is the "hottest," a project which was "hot" when received a week ago is shelved. Time is consumed dropping one project half-way through to pick up another. It is almost impossible to make intelligent decisions about priorities.

Where does your group stand with regard to problems of this type?

Our Procedure

Our group, responsible for analysing, improving, and developing procedures for one department of a large electronics company, was spending too much time typing and retyping lists for assigning, reporting status, and handling priorities on projects. Information provided was not up to the minute. By the time a project list was typed and proofread, it was no longer current. Some of our lists were typed monthly. A good picture of the current workload was not available. Each *new* project received a No. 1 priority. We, therefore, analysed *our* procedures and developed the following method:

A New Method

To assign a project the supervisor prepares a project assignment instruction sheet, in duplicate. One copy is given to the analyst in a folder and used to record his time. The other copy is placed in a looseleaf binder along with other current and pending project assignment sheets. At the same time a visible index strip is prepared, showing the project title and number. (See Exhibit I).

If the project does not require immediate attention, the supervisor inserts the index strip into the "Pending" section of a metal visible strip holder. "Pending" is indicated by an "X" marked in the appropriate check block in the heading. (See Exhibit II). If the project requires immediate attention, the supervisor assigns it to an analyst by marking an "X" in pencil in the appropriate column. All entries subject to change are made in pencil. The supervisor also indicates the due date. The strip is then inserted into a metal holder in the *active* section and the

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ANALYST	☐ Active ☐ Completed ☒ Pending									Page 2 of 2	Date	
	TITLE	FACTS	DRAFT	COMMENTS	FINAL DRAFT	TYPING	APPROVAL	DISTRIB.	DUE DATE	FILE NO.	DATE COMPLETED
	Office Equipment Standardization									14.4/6.3	
	Personnel Requisition, Processing of									6.5/8.7	
	Inspection Procedure									9.1/2.5	

Exhibit I, Projects Pending

ANALYST	☒ Active ☐ Completed ☐ Pending								Page 1 of 2	Date 8/28/59	
DS LG JT BD WN	TITLE	FACTS	DRAFT	COMMENTS	FINAL DRAFT	TYPING	APPROVAL	DISTRIB.	DUE DATE	FILE NO.	DATE COMPLETED
X	Office Equipment Standardization	X	3	X	X	X	X		10/ 5/59	14.4/6.3	
X	Overshipments, Receiving of	X	2	X	X				10/12/59	13.2/4.3	
X	Payment of Supplier Invoices	X	2						10/16/59	15.1/3.2	

Exhibit II, Project Identification

ANALYST	☐ Active ☒ Completed ☐ Pending								Page 1 of 2	Date 11/2/59	
DS LG JT BD WN	TITLE	FACTS	DRAFT	COMMENTS	FINAL DRAFT	TYPING	APPROVAL	DISTRIB.	DUE DATE	FILE NO.	DATE COMPLETED
X	Office Equipment Standardization	X	3	X	X	X	X	X	10/4/59	14.4/6.3	10/5/59
X	Company Cars, Request for	X	2	X	X	X	X	X	10/6/59	12.3/2.8	10/6/59
X	Purchase Order Preparation	X	4	X	X	X	X	X	10/5/59	5.3/8.1	10/7/59

Exhibit III, Projects Completed

appropriate check block is marked to indicate an "active" status. As the analyst completes a phase of the project, he informs a secretary who records, under the appropriate heading on the visible index strip, the progress made. The metal visible strip holders may be removed from the metal stand.

Project work sheets, flow diagrams, etc., are numbered and are so indicated on the strip. As a project is completed, the secretary indicates the "date completed," removes the visible index strip from the active category, and places it in the "Completed" holder.

Once a week the visible strip holders showing active and pending projects are sent to the Reproduction function where a Xerox Multilith paper plate is made for each page. These are used to reproduce multilith copies of our status report.

Status Reports

Each analyst gets a copy of the weekly status reports to be used as a working guide during the week. The supervisor uses his copy to determine work-load and to assign projects. Copies of the reports are also given to each member of the staff in the department. Each member notes relative priorities of projects in his area and in relation to other projects "in the mill." Since each analyst works in definite areas, his current work-load can be determined at a glance. Once a month a "Completed" list is reproduced. (See Exhibit III)

A pending project may be activated simply by transferring its index strip from the pending holder to the active holder.

All in all, this procedure gives us, at low cost with a minimum of typing and proofreading, an up-to-the-minute picture of (1) who is working on what project, (2) what the status is, (3) when the project will be completed, (4) what the workload is, and (5) which projects have priority.

By taking the time to analyse our own internal procedure, we were able to develop improved methods. If you take the time to analyse the administrative procedures of your Systems and Procedures group, you will undoubtedly develop similar improvements.

s/p/a

Corporate Records Retention, *Volume 2*, "A guide to Canadian Federal and Provincial Requirements" edited by Robert B. Wheelan; Controllership Foundation, Inc., Two Park Ave., New York 16, 275 pp., 1959, $10.*

This is an easy-to-read reference book, of the various sections of the Canadian Federal and Provincial statutes in effect on December 31, 1958, pertaining to records corporations must maintain and retain for inspection by various authorities.

The usefulness of this book, which would be more aptly entitled "Corporate Records Maintenance," lies in the orderly manner in which it is arranged; a Federal section followed by a section for each of the ten provinces. Each section deals first with the statutes and regulations applicable to all corporations (The Companies Act), and then with the legislation covering such matters as taxation, labour, trade and commerce, followed by requirements peculiar to certain industries. Because of the alphabetical arrangement of the statutes within each section, the book acts as its own index. In addition, two "quick reference" tables, competently footnoted, summarize the Federal and Provincial retention requirements and the limitations which affect such records retention.

For lawyers, accountants, and systems people whose responsibilities may require them to establish or vary the form and extent of the records maintained and retained by a Canadian corporation, this volume is a "must." Early reference to this book to ascertain statutory ground rules of record keeping may save hours of time later. *(Reviewed by Stephen Elliott, Riddell, Stead, Graham & Hutchison, Chartered Accountants, Toronto)*

*See May 1959 issue of *Systems & Procedures* for our review of Volume I.

Preparing the Office Manual, *by M. Graham Kellogg; American Managament Association, 72 pp., 1959, $2.25.*

This American Management Association Research Study, No. 36, presents the result of a questionnaire answered by 134 firms which use office service manuals in one way or another. The questionnaire was originally directed to 500 firms picked at random and the number of respondents seems significant. They range in size from a 15-employee firm to one of 250,000. Gross incomes range from something less than $500,000 to more than $100,000,000 a year. The list represents nearly every type of business, even two schools.

The report is divided into two sections. The first is devoted to a brief historical introduction and the findings; the second, to a series of seventeen exhibits illustrating how some of the firms handle certain phases of their manuals. The text is well illustrated with eleven statistical tables dealing with such facts as how long a respondent firm has used an office manual, which individual or unit is responsible for preparation of the manual, and the style of writing that is used.

The text of the report is handled so that anyone interested in preparing an office manual, although not an expert, can digest it easily and forthwith produce one which would be devoid of some of the more glaring errors of the "uninitiated." Writing style, method of reproduction, format of the manual, and technique for gathering and writing materials are among some of the more interesting subjects.

A series of exhibits in the second section of the booklet is highly informative and serves as an excellent illustration of items discussed in the text.

Not the least important portion of the publication is a comprehensive "Reading List" which closes the report. Selected books, pamphlets, and articles appearing in magazines and periodicals are listed to help the reader enlarge his understanding of problems involved in office manual preparation.

For the seasoned systems man, much of the material in this publication is "old stuff" but compiled in a handy reference form which is useful. For the neophyte, the art of manual preparation is made easier as a result of this publication. *(Reviewed by John H. Burns, R.C.A.)*

Systems and Procedures Responsibility, *by Philip H. Thurston; Harvard University, Soldiers Field, Boston, 110 pp., 1959, $2.50.*

This book,* subtitled "An administrative view of the division of responsibility between operating people and specialists for systems and procedures work," is based on information gathered by Mr. Thurston during the preparation of his doctoral thesis. Over a period of several months, the author attended meetings, interviewed employees, reviewed memoranda, and generally observed systems work in six manufacturing companies, ranging in size from 25,000 to 175,000 employees. The study included those areas of work generally included in the definition of "systems," whether performed by "systems specialists" or other personnel, and the emphasis was on the information processing aspect.

The author reports on 32 individual systems projects which he classifies as follows:

Classification	*Planning by:*	*Installation by:*
1st	Specialists	Specialists
2nd	Operating people	Operating people
3rd	Specialists	Operating people
4th	Specialists and Operating people	Specialists and Operating people

A chapter is devoted to each of the four classifications. Each project within a classification is discussed in terms of the general nature of the project, relevant background and authority for the project, the responsibilities for planning and installation, and the relative success of the project. Particular reasons for the success or failure of each project are brought out and each chapter concludes with a summary of the similarities among the various cases discussed.

In a brief final chapter the author draws some conclusions concerning the assignment of systems responsibilities. Few systems people will quarrel with the first three of his general findings; namely, that systems

*A special printing of this book will be distributed to members of S.P.A.

specialists and operating personnel complement each other, that a trial installation for any new procedure is valuable, and that there should be a continuing responsibility for the entire project until installation is completed. His fourth—that the proper assignment of the leadership responsibility in systems projects is with operating personnel —should furnish a good subject for debate from now until dooms-day. To quote the author ". . . it may often be the operating manager rather than the specialist who is better qualified for leadership responsibility in systems work." Mr. Thurston's arguments are cogent but he appears to view the systems specialist as an "idea man"; a builder of elaborate structures not related to the realities of mundane operations.

In the opinion of the reviewer, the shortcomings of individual systems men have been generalized into an indictment of the species. We are, however, consoled by the thought that ". . . wise project leadership will leave with the analyst responsibility sufficient to involve him in the successful completion of a project and to enable him to find a measure of satisfaction therein."

Some of Mr. Thurston's observations hit uncomfortably close, and his book could well serve as a checklist on how *not* to conduct a systems project. Many will not agree with his conclusions, but the book is "must" reading for every student of systems or organization. *(Reviewed by Robert S. Straith, Lybrand, Ross Bros. & Montgomery)*

Handbook of Automation, Computation, and Control, *Volume 2, "Computers and Data Processing," edited by Eugene Grabbe, Simon Ramo, and Dean E. Wooldridge; John Wiley and Sons, Inc., New York, 1959, $17.50.*

Whereas Volume 1* of the ambitious and extensive work was concerned more with those subjects of interest to the Operations Researchers, Volume 2 is devoted entirely to the design and use of analog and digital computers and data processors. Volume 2, therefore, probably will be more understandable to the average person engaged in business systems analysis and planning. In general, the *Handbook* assumes some engineering training. One of its primary aims is to serve as an information source and refresher for practicing engineers.

Volume 2 contains six sections of which the first four (A, B, C, & D) have special interest for the Systems man engaged or interested in EDP: (A) consists of one chapter about computer terminology and symbols, (B) consists of one chapter about digital computer programming, (C) consists of 9 chapters and deals most directly with the area of his everyday concern—the use of digital computers and data processing—and probably will be of greatest interest to the Systems man. (D) is concerned with the design of digital computers and also contains nine chapters. It provides plenty of practical theory and "knowhow" as a basis for better understanding of EDP equipment if the Systems man feels he needs it to do a better job.

The last two sections, a total of 11 chapters, deal with the design and application of anolog computers and unusual computer systems. They are for the engineer and, in this reviewer's opinion, not at all for the average Systems man engaged in EDP areas.

The chapters are written by a highly impressive list of authors. Each starts with definitions and description aimed at providing perspective and moves rapidly to theory, analysis, and applications. Combined, the chapters form an unparalleled frame of reference and background of material for understanding some modern techniques of importance to business and industry. Undoubtedly, the *Handbook* may be considered as a pioneering effort in a field that is steadily pushing back the frontiers of business and economic activity. *(Reviewed by Jeffry Keller, Consultant, Keller Associates)*

s/p/a

Correction: The source for the publication *Electronics in Business* is the Bureau of Business and Economic Research, 20 Morrill Hall, Michigan State University, East Lansing, and not the Michigan State University Press as published in the August, 1959 issue of *Systems & Procedures.*

*See February 1959 issue of *Systems & Procedures* for our review of Volume 1.

A Systems Training Program

▶ With American business on the threshold of a new decade in which the potential for scientific management break-through defies imagination, the responsibilities of a systems manager assume even greater proportions to use intelligently and profitably the many new and marvelous techniques and machines which are now at its doorstep. In the preparatory cycle, a most important segment of management to be trained is the newcomers from universities and graduate schools, for these are the people who will soon have the responsibility of scientific programming, and evaluations of management decisions and planning.

In assuming responsibility for this training, the present systems manager must develop and present an objective training program to his management — one which will not only include intensive, specialized training for selected individuals but will provide general, practical systems training for the entire management team. In recruiting potential specialists from colleges, the training program must be attractive and offer challenging potential. Paradoxically, promising candidates profess great interest in jobs where recognition and broad exposure to management problems will be rapid, yet rarely do we find one who recognizes that the systems department, a staff function cutting across organization lines, may offer that job opportunity. Failure on their part to select systems work as a stepping stone to management advancement, points even more strongly to the need for company-sponsored systems education to supply training which is apparently lacking in college curriculums.

An acceptable format for a systems training program for lower levels of management may vary greatly. It must, of course, be tailored to meet the specific needs and attitudes of the company. There are, however, certain fundamental steps which can easily be taken to get a longer-range or more sophisticated program under way. For example:

1. Have the personnel relations department structure its recruiting and testing procedures so as to spot enterprising candidates for systems work and have such candidates reviewed and counseled by the systems manager about opportunities in systems work.
2. Sell management on including as part of its program for trainees selected a scheduled assignment of each trainee to the systems and procedures department for practical exposure to systems analysis and automated data processing methods.
3. Encourage other department heads to assign promising trainees to projects involving systems analysis, particularly where guidance will be under an experienced analyst.
4. Develop and conduct in-plant seminars for management personnel on the fundamentals of work simplification, work measurement, forms and records management, punched card, and automated data processing.

Although systems training as described here borders on the "blue-sky," management can ill afford to overlook an objectively planned and carefully presented program. The awareness by management during the present decade of its unpreparedness for the efficient use of computers and other electronic devices and the costly decisions or lack of them associated with the new equipment, should furnish a potent base upon which to convince top executives of the need for a carefully structured program in systems, one which will lay the groundwork for certain basic knowledge and skills needed to use intelligently and profitably the even more wonderous electronic data processing machines and scientific management techniques which are yet to come. *(Colver Gordon, Chairman, SPA Publications Committee)* **s/p/a**

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